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THE STRIPED BASS IN CALIFORNIA.

By N. B. SCOFIELD and H. C. BRYANT.

To develop a fishery which has been known to yield over 1,750,000 pounds valued at a half million dollars annually, with an original outlay of less than a thousand dollars, to say nothing of continuous, superb sport and valuable food furnished the anglers of the state, is an accomplishment that merits review. The striped bass, originally native to the Atlantic seaboard, is now a common food and game fish of California, the basis of a great fishery, and so highly prized by anglers that numerous bass clubs find existence in the cities and bass fishing enthusiasts line the banks of sloughs whenever this fish is pro-

curable. Unquestionably, next to trout, the striped bass is the most popular game fish of northern California.

Roccus linneatus, although known commonly as striped bass, is in reality not a true bass, nor is it a true perch, though possibly related to both. Most ichthyologists consider it a transitional type between the perch and the sea bass. Among fishermen, especially in the south, the fish has long been dubbed "rock fish."

The original distribution of the striped bass or "rock fish" included the Atlantic coast from the Gulf of St. Lawrence to northern Florida, with a few more or less authentic records of its occurrence in the Gulf of Mexico. As indicated by the fisheries, its present centers of abundance lie between Cape Cod and North Carolina, where it ascends all suitable rivers to spawn and in the pursuit of food. According to tradition, many years ago it was very abundant on the New England coast, north of Cape Cod, in the Bay of Fundy, on the Coast of Nova Scotia and gulf coast of New Brunswick. In the United States north of Cape Cod, it is now comparatively rare. Although formerly known to ascend the St. Lawrence in large numbers, some of them as far as Quebec, this fish is now very scarce in that river. In the early nineties, the striped bass was most abundant in the Chesapeake and Delaware Bay region and in the waters of New York and southern New England.

Plantings of Striped Bass in California.

1879—135 from New Jersey, near Martinez.

1882—300 from New Jersey, Suisun Bay near Army Point.

1899—Less than dozen, Humboldt Bay.

1903—75 (size, 2 to 3½ lbs.), Brackish lagoons of Orange County, mouth of Santa Ana River.

1905—80 (5 to 8-inch fish), Brackish lake at Crescent City, Del Norte County.

1909—Car load (6 in. to 4 lbs.), North Santa Ana River, Orange County.

1916—1800, North San Diego River, San Diego County.

1916—2000, Morro Bay, San Luis Obispo County.

1919—1500, Bolsa Chica, Orange County.

1919—1500, Morro Bay, San Luis Obispo County.

Introduction Into California.

"The striped bass was first introduced into the waters of the Pacific slope in 1879, at the same time that a consignment of eastern lobsters was taken across the continent. The acclimatization of this species was undertaken at the suggestion of Mr. S. R. Throckmorton, then chairman of the California Fish Commission * * *.

"In July, 1879, Mr. Livingston Stone, of the United States Fish Commission, made a collection of living striped bass in the Navesink River, New Jersey, for transportation to California. He obtained 132 fish from 1½ to 3 inches long and 30 medium-sized specimens. Twenty-five of these died during transportation and several were thrown away, but the remainder, about 135, reached California in good condition and were deposited in Carquinez Strait at Martinez.

"The second and only other plant of striped bass in California waters was made in 1882, when Mr. J. G. Woodbury of the California Fish Commission carried about 300 fish, 5 to 9 inches long, from the Shrewsbury River, New Jersey to Suisun Bay, where they were deposited at Army Point, about 3 miles from the preceding plant." (Smith, 1896.)

Increase in size was noticeable in the catches of succeeding years. In September, 1883, a 17-pound striped bass was taken at Monterey Bay. The following month a 16-pound fish was caught in the Sacramento River. On March 11, 1884, an 18½-pounder was offered for sale in the San Francisco market. Ten years after planting, on June 16, 1889, a 45-pound striped bass was sold on the San Francisco market. (Smith, 1896.)

In 1889, hundreds of them weighing from one-half to a pound each, were being caught and sold in the San Francisco markets. From 1889 to 1892, the number caught had increased 250 per cent. After 1900 they were occasionally taken in tributary streams. Previous to 1903 striped bass weighing twelve pounds were taken in the Feather River near Oroville and were numerous in the Tuolumne River above Modesto in the Stanislaus and in the Merced and San Joaquin rivers. In the Sacramento River striped bass have been taken as far north as Kennett.

For many years there was no great extension of range along the coast. Striped bass were limited largely to the Sacramento and San Joaquin rivers, with occasional specimens being taken from Monterey Bay northward as far as the mouth of Russian River in Sonoma County. By 1896 it was fairly abundant in the mouth of Salinas River; a few years later it was taken in the coastal streams of Oregon, and in the fall of 1906, a half dozen specimens were secured by the U. S. Bureau of Fisheries in traps at the mouth of the Columbia River. (Smith, 1910.)

In 1925 striped bass were being caught in commercial quantities in the Coos Bay region, Oregon, and dealers at Big Bend, Oregon, were looking for a market for these fish in California.

Considering the small number of fish introduced and their remarkable increase in a few years, the result obtained from the introduction of the striped bass into California is one of the greatest feats of acclimatization of new species of fish in the history of fishculture.

Desirous of furnishing the northern coast countries with this most desirable food fish an attempt was made in 1899 to introduce the striped bass into the streams entering Humboldt Bay. Most of the shipment died en route and less than a dozen were actually planted. Whether or not this plant was successful is not known, but three or four specimens were secured in the Eel River ranging as high as twenty pounds in weight in 1907, and an occasional bass is taken in Klamath River to the north.

In 1903 seventy-five bass six inches to three and one-half pounds in weight were planted in brackish lagoons at the mouth of the Santa Ana River in Orange County. Another plant was made the following year. Finally a carload of striped bass ranging in size from six inches to four pounds in weight was collected in 1909 in the Straits of Carquinez, at Port Costa, within two miles of where the original plant of bass was made twenty-seven years ago and transported without loss of a single fish to southern California, where they were distributed in suitable waters of limited area in Orange County. This third shipment made into these waters within eight years was expected to determine beyond all question their adaptability to the conditions found there.

On October 26, 1916, eighteen hundred small striped bass were planted near the mouth of San Diego River by the Fish and Game Commission,

and since that time small striped bass have on several occasions been observed near the place of planting.

Mr. A. G. Pearson of San Diego reported that on or about June 20, 1919, he took several small striped bass ranging from five to eight inches in length in San Diego River near its outlet into Mission Bay.

The fry at the time of planting were between two and three inches long, being fish of the year, spawned in April or May, 1916. If these fry had grown at the rate they do in San Francisco Bay they would have reached the size of five to eight inches in 1917, during their second year. If the fry reported by Mr. Pearson were some of the fry liberated in 1916 they were in their fourth year and their rate of growth had been remarkably slow. It was suggested that these five to eight-inch fish were the progeny of the fish planted in 1916, but that can



FIG.14. Catch of striped bass on Salinas River June 9, 1921. Five of these fish weighed 15 pounds or over. The fishermen are G. O. Clark, E. W. Smutz, and Douglas Hollingworth of Watsonville. Photograph by G. A. Clark.

hardly be, as a sufficient length of time had not elapsed. It is pretty certain that striped bass do not spawn earlier than their fourth year, and the fish planted in 1916 would not have completed their fourth year until the spring of 1920. It would seem more probable that other striped bass plants have been made of which we have no record, or else that striped bass have strayed to the south and occasionally spawn as far south as San Diego.

In the same year a plant was made in Morro Bay. Again in 1919 5000 small striped bass were secured in the Sacramento River and 2500 shipped in the fish car of the Fish and Game Commission to Morro Bay, San Luis Obispo County, and 2500 to Bolsa Chica, Orange County.

On Saturday, November 15, 1919, the California Fish and Game Commission shipped about 2500 striped bass from two and one-half to five inches in length to the Fish and Game Commission of the Territory

of Hawaii to be planted in streams in the vicinity of Honolulu. The fish were caught in a seine on the Benicia flats, held in live cars until sufficient were collected to make the shipment, and then were put aboard the Matson Navigation Company's steamer *Mau*i. Here the fish were distributed in six large salmon tierces that had been arranged on the main upper deck in from the office of the chief engineer, who took personal charge of them.

**Life History
and Habits.**

Although known to be an anadromous fish, the striped bass is to be found in the San Francisco Bay region or in the lower Sacramento or San Joaquin rivers in varying numbers in any month of the year. In the lower rivers, however, more of them are caught in the spring and autumn.

Two distinct migrations take place. In the spring of the year, beginning during March and extending through April, May and part of June, the spawning migration of striped bass takes place. They come from the deeper holes in the lower rivers and bays, also from the ocean, and run well up the Sacramento and San Joaquin rivers and some of the smaller tributaries like Napa River. This run consists mainly of large bass. The average weight of these fish was formerly between twelve and fifteen pounds. Thirty-pound fish were common, and occasionally fifty and sixty-pound fish were caught. At present fewer large fish are taken and the average weight is less.

In the fall of the year the run of what is known as "winter bass" takes place. These fish average much smaller. They come into the bays, run into the sloughs and for some distance up the rivers for the purpose of feeding. Some of these bass may be with spawn, but the eggs probably are not deposited until after March when the water temperature gets above sixty degrees. This fall run commences usually in September, the time being somewhat variable, and lasts from two weeks to two months. The fish of this run are often immature bass, not often over five or six pounds, and according to the fishermen, are bright and fresh from the sea. The small sized bass are more apt to be found in schools than the large fish, and the large catches in gill nets are usually of this size. This is particularly true of catches in gill nets in the lower bays. In the lower bays they are often found on the flats voraciously feeding on schools of small fish, making a sucking noise similar to that of the carp when feeding at the surface of the water. Often a school of these bass will run into one of the numerous tule-lined sloughs of the Sacramento and San Joaquin deltas, evidently attracted by the small river fish which they drive before them, feeding as they go. Such schools are often indicated by a large number of shags, gulls and fishing birds which take this advantage to feed upon the maimed and frightened fish. Several years ago commercial fishermen would look for these bass schools in the sloughs and would occasionally make catches so large they could not take all in their boat and would have to put some on the bank and come back later for them. But these catches are no longer made, for in 1915 the legislature passed laws which closed the sloughs to commercial fishing.

Striped bass during these two runs or at any other time seem to be quite notional. They will suddenly appear on the river fishing drifts and as suddenly disappear again, and no trace of them can be found. Commercial fishermen who have had fifteen or twenty years' experience

fishing for them in these waters still trust mostly to chance in locating them, not being able to figure out their movements other than that rough water spoils the fishing, the theory being that they leave the flats and sloughs in rough weather and take to the deeper parts of the river where the nets do not reach them.

Nearly twenty years ago when an attempt was made in California to artificially propagate striped bass, most of the large "spawn" bass were being caught on the San Joaquin River near Bouldin Island. But this is now changed, and although there is a spawning migration of bass in the lower San Joaquin River, the larger run is now in the Sacramento River and were caught in nets as far up as the mouth of Feather River until netting was prohibited above the bridge at Sacramento by the legislature in 1925. After spawning they ascend the rivers for long distances, or enter the sloughs or flooded lands in search of food, for after spawning they again become voracious feeders.

In the years 1903, 1904 and 1905 spawn bass were so plentiful about Bouldin Island that the fishermen, in order not to glut the market, agreed among themselves to catch no more than 600 pounds to the boat each twenty-four hours. They frequently got more than double this amount at one drift of a gill net.

Many of these fish were with mature eggs and the fishermen all testify that the bottoms of their fish lockers were covered with eggs. The main spawning season is between the middle of April and the middle of June. The spawning migration commences in the bay and lower river a month earlier than this.

SPAWNING.

"The striped bass spawns in the late spring and early summer, ascending rivers and their tributaries for the purpose. The principal streams on the Atlantic coast of the United States are those flowing into Albermarle Sound, Chesapeake Bay and New York Bay. From North Carolina to New Jersey the spawning time appears to be in late April and early May; farther north, in late May and June.
* * *

"An observer described some of the breeding habits of the fish to the effect that when a female was in spawning condition the males gathered about her in great numbers. A single female which might weigh from five to fifty pounds would have around her twenty, thirty or fifty small male fish, all of which weighed less than two pounds each, and they seemed to be the only males present. The water was stated to be discolored with blood from the fish 'finning' one another while contending for the female." (U. S. Bur. of Fisheries Memorandum.)

The eggs of the striped bass are about one-twentieth of an inch in diameter, produced in large numbers. In spawning operations at Bouldin Island, California, 20,000 to 500,000 eggs were secured from ripe females. Two females spawned produced 1,000,000 eggs each. According to a report a twenty-pound female in the east has produced 1,500,000 eggs estimated on the basis of 25,000 to a quart.

Convinced of the advisability of attempting to increase the supply by artificial propagation, an investigation of hatchery sites was begun by the California Fish and Game Commission in 1907. The funds at that time being insufficient to bear the expense unaided, the subject was

taken up with the United States Bureau of Fisheries at Washington, with the result that Capt. G. H. Lambson, in charge of the salmon hatching work of the Federal Bureau of Fisheries in California, was instructed to cooperate. Accordingly, in the month of May, 1907, operations were commenced at Bouldin Island, on the San Joaquin River, at which point a small hatchery building was constructed at the expense of the commission. A small pumping plant for the purpose of raising water into two tanks of 2000 gallons each to furnish the necessary amount of water for hatching operations was also in-



FIG. 15. Three striped bass caught by trolling in Salinas River July 9, 1921, by Douglas Hollingworth of Watsonville. The fish weighed 12, 14 and 17 pounds respectively. Photograph by G. A. Clark.

stalled. The equipment of the hatchery, McDonald hatching jars, was furnished by the United States Bureau of Fisheries. The hatchery depended on the commercial fishermen for any ripe eggs they might take.

Although fishermen took a lively interest and assisted in every way, yet the results were unsatisfactory. It was found that by the same methods followed in "stripping" trout and salmon, the eggs and milt

could be taken from striped bass, and yet neither the eggs nor milt be sufficiently matured to insure fertilization. The result was many eggs were taken that were apparently ripe, but whose fertility could not be definitely determined until after the eggs were placed in the hatchery. The total take of eggs for the first year's operations was about eighteen million, about three times the amount taken up to that time on the Atlantic coast in a single season of which there is any record. The percentage fertilized and hatched, however, was small. From many lots of eggs no fish hatched. Other lots hatched 5 per cent only, and from that up to 50 and 60 per cent. One lot hatched a very high percentage of the eggs.

Nevertheless, the results of the season's work were encouraging, for hatching striped bass was still in the experimental stage, and the results in number of eggs hatched during the season of 1907 were much better than had been obtained on the Atlantic coast. It was not determined just why so many eggs failed to hatch, but it was laid to unsuitable water or some defect in hatchery method.

The season of 1908 found the hatchery better prepared for work and equipped with microscopes and apparatus for determining the cause of the failure of so many eggs to hatch. This season the run of bass was almost a failure, and the take of eggs so small that many of the experiments came to nothing for lack of eggs with which to experiment.

It was soon found that the first cleavage of the germinal disc in the developing egg takes place about two hours after fertilization. So with the microscope it was possible to tell within two hours after the eggs were taken just what per cent was fertilized and developing. It was found also that the loss of eggs was not due to bad water or any defective method of handling the eggs in the hatchery, but due to the nonfertilization of the eggs. That fungus could be established through the use of copper sulphate 1-500,000 parts was demonstrated.

Hatching takes place about three days after impregnation. The yolk-sac is not entirely absorbed until after the seventh day, and the stomach is not well developed until about the thirteenth day.

Young fry were kept for two weeks in McDonald hatching jars by removing the siphon tubes and replacing the top with silk bolting cloth, allowing a small stream of water to flow on the cloth.

Artificial propagation was finally abandoned after further discouraging work in the seasons of 1909 and 1910, when few ripe females were obtainable.

RATE OF GROWTH.

"The rate of growth is very rapid. Young fish an inch long found in the Delaware River in the second week of June, about the middle of October were observed to have grown to the length of four and one-half inches. Young fish five to nine inches in length, which are taken in quantities in the Potomac in February and March, are supposed to be the young of the previous year.

"The striped bass has been kept in a small pond of fresh water and fed upon crabs and oysters, increasing in about eleven months from six to twenty inches in length. It is stated that in a Rhode Island pond a bass weighing one-half to one pound in June increased to a weight of

six pounds in the following October.” (U. S. Bur. Fisheries Memorandum.)

SIZE ATTAINED.

According to the U. S. Bureau of Fisheries, the largest striped bass records are of several taken at Edenton, North Carolina, each of which weighed 125 pounds. One taken at Orleans, Massachusetts, weighed 112 pounds. Such a fish would measure at least six feet in length.



FIG. 16. A striped bass weighing $62\frac{1}{2}$ pounds caught in the Napa River by William West September 11, 1911. This is the largest fish recorded for the Napa River. Photograph by William West.

Individuals of 60 and 70 pounds are not uncommon, although the average is probably not over four or five pounds.

Mr. George Neale, former executive officer of the Fish and Game Commission, saw and weighed a striped bass in a San Francisco market that tipped the scales at 78 pounds. The dealer told him that two days before he had one weighing 82 pounds. This was about 1910.

The fish shown in the accompanying photograph, the largest bass ever caught in Napa River by hook and line, was taken by William

West September 11, 1911. This fish weighed 62½ pounds and was taken on a 7B Wilson spoon, all copper.

Another bass caught in Napa River February 27, 1925, by A. C. Doble weighed 44 pounds and measured 49 inches by 29 inches in girth.

In November, 1924, Messrs. Johnson and Kelly, using live suckers as bait, caught two bass weighing 32 and 54 pounds each, respectively, in the Russian River near Monte Rio. Mr. Jim Cahill of Sebastopol secured a 57-pound striped bass in Forest Pool on the Russian River in October, 1924. Several 40 and 45-pound bass were taken in the same river during the season of 1925.

There are many unverified statements as to the size of striped bass caught years ago when larger ones were taken more often.

Fish weighing less than three pounds (now size limit of 20 inches) are protected the year round in California, and fish of more than ten pounds in weight can not be taken during the spawning season.

HABITS.

"The striped bass, although migratory and anadromous, does not cover great distances nor spend much of its life in the ocean as does the salmon, for it may be found in the range throughout the year. It may be taken in salt, brackish or fresh water, even being kept in artificial ponds of fresh water for considerable lengths of time without detriment." (U. S. Bur. Fisheries Memorandum.)

Young fish apparently feed in shallow water, for they are often found in overflow areas and must be rescued when these areas dry up in the fall. Many young fish also feed in San Francisco Bay, for a bay with rivers entering it is always a nursery for young fish. Where there is an intermingling of fresh and salt water, as in the upper San Francisco Bay, there is a prodigal growth of small animal life, including shrimps and other species of small crustaceans. Upon this small life the young fishes feed.

When Chinese shrimp fishing was allowed in upper San Francisco Bay, large numbers of small striped bass were killed in the nets during winter months. The boats which fished below San Pablo Bay in the deeper water near Red Rock and the stone quarry on the opposite side caught smaller quantities of young fish than those above in San Pablo Bay, but they caught more of the young striped bass than any others.

There is evidence to believe that in the late fall and winter the young bass of the year which have reached a length of from three to five inches abandon the shallow water of the "flats" and move into the deeper water of the channels and thence pass out into the ocean where they spread up and down the coast for a short distance. During the spring young bass of this size appear in numbers in the shallow waters of the inner lagoon of Drakes Bay and in the shallows at the head of Tomales Bay. To the south they appear in Elkhorn Slough, but these may be the result of bass spawning in Salinas River. We know of no proof that striped bass spawn in Salinas River. It is believed that no spawning takes place in either Drakes Bay or Tomales Bay or the fresh water tributaries and that the young bass appearing there come from San Francisco Bay. It is known that the young bass of the year are plentiful in San Francisco and upper bays until the cold of winter comes on. In collecting the young bass for transplanting small meshed

seines are used, and experience in getting these fish for shipment has taught us that the best time to get them in numbers is in the fall before cold weather sets in, and that after cold weather sets in it is about impossible to find enough to make a shipment. The fact that the shrimp nets formerly set on either side of the straits between San Pablo and San Francisco bays in about 30 feet of water caught considerable numbers of young striped bass of the year while they were drifting out on the ebb tide is the best of evidence that there is a seaward migration of the young bass in the fall and winter. It is not likely that these young bass which pass out to sea return for at least a year. Investigations on the age and rate of growth of striped bass in the San Francisco Bay region now being carried on by the commission is likely to throw much light on these questions. Already it is fairly well shown from a study of the scale growth to determine age, that a large proportion of the bass studied passed out of fresh water in the fall and made a large sea growth during their second year. A smaller number remain until the second winter before migrating to the sea and these make their large sea growth in their third year.

Many of these fish were with mature eggs, and the fishermen all testify that the bottoms of their fish lockers were covered with eggs. The main spawning season is between the middle of April and the middle of June. The spawning migration commences in the bay and lower rivers a month earlier than this.

Striped bass occasionally reach fresh water at the headwaters of streams in their spawning migration. Two fish weighing five and six pounds, respectively, were taken in Dry Creek, a tributary of the Napa River, during the spring of 1925. This species is known as far up the Sacramento River as Redding and up the San Joaquin as far as Mendota dam.

In 1914, according to W. P. West of Napa, a bass was speared near Calistoga, 27 miles from tidewater. Fish have frequently been seen above the Trancas dam just above tidewater, but in distinctly fresh water pools. They appeared to be in a very excited state of mind, moving swiftly around as if looking for a way out. This dam consists of six fish ladders with a rise of at least 12 feet, the water in the ladders being very swift. The fish must necessarily jump to get up. When the fish are found above this dam they will not touch any bait no matter what is offered.

Every fisherman knows that striped bass are very sporadic in their occurrence and that in a place where large catches have been made one day the fish are not to be found the next day. Supposedly the same school of fish remain in the same pools to feed each day, even though there may be a daily migration with the tides. Inability to catch fish with hook and line is not always an indication of "no fish," but may be only an indication that they are not feeding. The movements of striped bass in a stream are not definitely known and much is still to be learned regarding feeding preferences.

FOOD.

The striped bass is reputed to be a voracious fish preying largely upon smaller fishes, and is particularly abundant at the time of the spring runs of shad and alewives or river herring. At this season

it is well fed and plump. To some extent it frequents the rocky shores and beaches of bays and sounds at high tide in search of crabs, shrimp and other food, and, at the mouths of creeks, smaller individuals lie in wait for the schools of small fishes and crustaceans which supply them with food. It also subsists upon mollusks, sea worms, etc. (U. S. Bur. Fisheries Memorandum.)



FIG. 17. A striped bass caught February 27, 1925, in the Napa River by A. C. Dobbs. The fish weighed 44 pounds, had a length of 49 inches and a girth of 29 inches. Photograph by Ed Bowen.

FOOD OF ADULT STRIPED BASS IN CALIFORNIA.

The food of the adult striped bass in the rivers is principally carp, hardheads and split-tails. Nearly all the fishermen claim that when the carp is plentiful it is their principal food. They even advance the theory that the bass are not so numerous in the San Joaquin because the carp are not so plentiful on the lower river as they were, and they run up the Sacramento because of their great abundance in those waters.

An investigator for the United States Bureau of Fisheries in 1894 reported that seven out of every ten striped bass examined in California contained carp. Carp even as large as two pounds have been found in stomachs. In spite of this evidence there are many who believe that live carp are not taken if other small scaled fishes are obtainable.

In the stomachs of bass W. P. West of Napa has found crabs, minnows 6 inches long, clams, duck entrails and sardines. Crabs and small fish appear to be the favorite food of bass in the Napa River.

Fishermen have occasionally found a dead striped bass with a catfish caught in its throat by the spines. Catfish weighing up to two pounds appear to be a common item in the diet in the sloughs.

FOOD OF YOUNG STRIPED BASS IN CALIFORNIA.

An examination of the stomachs of fifty young bass averaging three inches in length which were taken at "Morrison's Bight" in Napa Creek on September 10, 1908, showed the following contents: Crustaceans, a species of *Mysis*, 30 per cent; of young shrimp, 15 per cent; of a species of *Gammarus*, 1 per cent; of an isopod, 1 per cent, and 1 small crab; marine worms or annelids, a species of *Nereis*, 45 per cent; of species not recognizable, 5 per cent; small fish, species not recognizable, 2 per cent.

It will, therefore, be seen that on this feeding ground at least, marine worms comprise 50 per cent of the food, crustaceans of marine species 48 per cent, and small fish only 2 per cent. The young shrimp and young fish were taken from the stomachs of young bass of three to four inches in length and the other small crustaceans from the stomachs of specimens three inches and under in length, showing that the young bass begin feeding on the small species of crustaceans and worms, and as they grow in size are able to take the shrimp and young fish.

COMMERCIAL VALUE.

While the striped bass in California has come to be best known by the general public for its value as a game fish it is at the same time a very valuable commercial food fish and in the markets is prized next to salmon. The annual commercial catch of striped bass in California is near one million pounds and this amount is conserved in the state for under our state laws it can not be exported from the state. The amount of bass caught by anglers and used for food each year is hard to estimate but it probably would raise the total bass catch in the state to one million pounds.

"According to the Census Report of 1908, the striped bass fishery of the United States then amounted to 3,657,000 pounds, valued at \$314,000, the Atlantic coast fishery exceeding that of the Pacific coast by only 105,000 pounds with a value of \$45,000.

"On the Atlantic coast, Maryland, Virginia and North Carolina are paramount striped bass states, of which, according to the 1908 census, in order of pounds of fish caught, Maryland was first with 640,000 pounds, valued at \$65,000; North Carolina second, with 510,000 pounds, valued at \$36,000; Virginia third, with 502,000 pounds, valued at \$46,000. Of the remaining Middle Atlantic states, New Jersey and Delaware show the largest quantity—53,000 pounds each—valued at \$7,400 and \$7,300, respectively, followed by New York with 32,000

pounds, valued at \$5,300, and Pennsylvania with only 7,200 pounds, valued at \$800." (U. S. Bur. Fisheries Memorandum.)

On the Pacific coast, California is the only state with a striped bass fishery. During the eighties it commanded a high price even selling for \$1 a pound. However, by 1890, the striped bass was so well acclimated that it had become a well known market fish and sold for a less price than those marketed within its natural habitat in the east. In 1893 the San Francisco markets received only 79,738 pounds, but three years later this amount was increased to 363,747 pounds. In 1895 the price dropped to as low as six cents per pound. By 1899 this market was receiving nearly a million and a quarter pounds which brought the fishermen \$61,814. In 1904 1,570,404 pounds were landed at San Francisco for which the fishermen received \$92,116.

The 1908 census gave California 1,776,000 pounds, valued at \$135,000, and the 1915 statistical bulletin of the Bureau of Fisheries shows 1,784,448 pounds, valued at \$146,928.

With rigid restrictions relative to season and size limit in recent years (1916-1923), the fishery continues to yield from 600,000 to 1,500,000 pounds annually. At retail this fish sells for about 35 cents a pound.

The principal market catch is secured by gill net fishermen mainly from upper San Francisco bays and the lower Sacramento and San Joaquin rivers. A few are caught commercially with hook and line.

PROTECTIVE LEGISLATION.

Doubtless protective measures are largely responsible for the continued supply of this splendid food and game fish. As early as 1889 it was feared that the recently introduced striped bass were being exterminated before they had come to maturity and had a chance to reproduce. A county ordinance in San Francisco was accordingly passed prohibiting the sale of striped bass under eight pounds in weight. Later it was made unlawful to take bass under one pound, this limit being raised to three pounds in succeeding years.

By 1909 it was believed that additional protection was necessary as the intensity of the fishing was increasing owing to a large export trade and high prices. Accordingly, a nonexport law was enacted. This law was deemed advisable in spite of the fact that a closed season for commercial fishing had been declared during the spawning season in May or June.

The closed season did very little good for the reason that the season for salmon and shad was open at the same time and as each of those fish are running at that time large numbers of bass were killed in the nets and thrown away.

The striped bass conservation problem is a complicated one. During the spring spawning migration of striped bass we also have in the Sacramento and San Joaquin rivers shad and salmon which are also running up for the purpose of spawning. The shad are running during the latter part of March, through April, May, and into June. Salmon are running during this time and until October. The only time during which shad may be taken in commercial quantities is during this migration, and the main fishing grounds are in Suisun Bay and the lower rivers. Shad can not be caught without catching bass at the same time and it is extremely difficult to so regulate salmon fishing that striped

bass will not be caught at the same time. If nets are used for salmon or shad while striped bass are running, striped bass will surely be caught. If gill nets with meshes less than eight and one-half inches be prohibited so as to permit salmon fishing, the catch of bass is light, but the fishermen are not able to take shad as they are taken with meshes measuring from five and one-half inches to six and one-half inches. To prohibit nets with meshes less than eight and one-half inches during the entire shad run would be entirely too severe.

LEGAL PROTECTION.

Laws now provide against the shipment of striped bass out of the state; prohibit the sale or shipment of striped bass formerly less than three pounds in weight, now a size limit of twenty inches; the sale of striped bass of ten pounds or over in weight between March 1st and May 31st; the sale of striped bass of any size between May 16th and July 31st, or between September 17th and November 14h; the taking or having in possession at any time of any striped bass of less than twelve inches in length; the taking within Disricts 1, 2 and 3 of more than five striped bass per day; with provision against sale; the taking of striped bass between one hour after sunset or one hour before sunrise, or in nets on Saturday and Sunday; and the use of nets with a mesh smaller than five and one-half inches.

A law prohibits the use of nets with meshes measuring between five and five-eighths inches and seven and one-half inches in San Francisco and San Pablo bays, between March 1st and July 31st. This measure adopted to prevent shad fishing in these waters is a splendid protection to the striped bass spawning run through those bays. Besides this, fully 1000 miles of sloughs in the San Francisco Bay region have been closed to commercial striped bass fishing. The Sacramento River has been closed to commercial fishing above the city of Sacramento and the San Joaquin River has been closed above the Santa Fe railroad bridge in San Joaquin County. As a concession to the angler, a person may have in his possession in any one calendar day, not to exceed five striped bass between twelve and twenty-one inches in length, but such striped bass must be caught only with hook and line and must not be bought, sold or offered for sale.

It can be seen, therefore, that careful protection has been given striped bass in California, in fact, much greater protection than has been afforded in eastern states. Protection of spawning fish, closed seasons, size limit and limited sale, all contribute to the safeguarding of this valuable fish.

STRIPED BASS DECREASING.

For many years depletion has been evident in eastern states. For instance the 1920 season's catch of striped bass for the state of New York was only 24,437 pounds. The catch in California during the same period amoured to 671,731 pounds. In California there is also a decrease in catch. The annual commercial catch of striped bass shows a decrease of about 50 per cent since 1915.

If we are to use the commercial catch as an index of the abundance of bass we should be sure that we take account of all factors affecting the catch. If the fishing area, the seasons, netting restrictions and

fishing methods remain the same and still the catch falls off, then we can be quite sure that the bass are becoming less abundant, although we can not be sure whether it is the commercial fishing, water pollution, loss of too many spawners or unfavorable spawning conditions that are causing the decrease. But to be on the safe side we should consider commercial fishing the main cause.

On the other hand if fishing areas have been reduced, closed seasons established or restriction placed upon nets, it can not be rightly argued that the decreased catch means decreased abundance of bass. In the case of our striped bass the fishing area was greatly reduced in 1915, and several sloughs and rivers were closed before that. Closed seasons have been established and netting restrictions have been adopted which have made it unprofitable for fishermen to operate in San Pablo Bay during the spring spawning migration. It was to be expected that the catch would fall off. The fishing restrictions were enacted for the purpose of reducing the catch and if the reduced catch shows anything it shows that the restrictions were effective and that the bass are getting the protection they need and it is totally unfair to use the reduced catch as an argument that the bass are being exterminated.

If the fishing restrictions adopted are sufficient, the catch should, after a time, remain the same or even increase. The length of time it would take to show the benefit of the protection would depend upon the age at which the protected fish matured and spawned. Along this line it is interesting to note that, in spite of added protection given by our legislature in 1921 and 1923, the commercial striped bass catch in 1922 showed an increase of 84,000 pounds over the preceding year, and each year since has shown an increase in the catch.

However, along with this decrease in the commercial catch prior to 1922 was a decided scarcity of bass in many of the haunts where both anglers and commercial fishermen formerly found them abundant. The present scarcity is most noticeable in most parts of San Pablo Bay and in the mouths of sloughs tributary to it. On the other hand, striped bass are apparently more plentiful in some other places, and good angling has been enjoyed in places where they had been caught only in very limited numbers before. There are some ardent striped bass anglers who believe that these fish are just as plentiful as they ever were. They believe that some of the sloughs have been fished out by anglers, but that in some cases the bass have moved from their old haunts and have to be sought in other places. Some of the commercial fishermen say that the bass are about as numerous as ever but that they have moved, and that the best net fishing is to be found in places where the bass were formerly not so abundant.

Some commercial fishermen believe that striped bass are not so abundant as formerly.

Most bass anglers are firmly of the opinion that the bass are not only less plentiful but that they are on the road to extermination. Typical of the arguments advanced is the following:

"Great spawning grounds of the striped bass are located in the middle channel of the San Joaquin River. Large fish with a great accumulation of eggs are found there. Formerly as high as 1000 to 2000 pounds of large spawning striped bass would be taken there with nets at one time. In 1907 one angler took 39 fish weighing from 12 to

36 pounds. Now from 75 to 80 per cent of those taken run from two to five pounds in weight."

In spite of discouraging reports good seasons come. The year 1924 was an especially fine season for the angler of striped bass. The average price in the market continues to be 35 cents per pound.

It is our belief after reviewing all the evidence that striped bass are not so plentiful as they were. Large sized "spawn" bass are less abundant than they were, which is a pretty sure sign of over-fishing. But the increase in the catch of bass beginning with the year 1922 in spite of added fishing restrictions of 1921 and 1923 is the best of evidence that the bass are becoming more plentiful and that the effect of the fishing restrictions adopted began to show first in 1922 and that there is now a steady increase in the number of striped bass. It should not be argued that the falling off of the commercial catch prior to 1922 shows that the bass were being fished out by the nets and that there were less than half as many bass as in 1915. It is very much more likely that the 50 per cent decrease in the commercial catch was almost entirely due to the very good restrictive legislation which has been obtained through the efforts of the Fish and Game Commission's efficient enforcement of the protective laws.

The usual method of protecting fish against overfishing is to restrict the catch, and when efficient protective measures are adopted and enforced the resulting decrease in the catch should not be used as evidence that the fish are being exterminated. The scarcity of bass in some of their old haunts about San Pablo Bay we believe is largely due to the bass moving to other regions. This movement is caused mainly by the pollution of San Pablo Bay waters by the government's dredging operations about Mare Island and in dredging the channel from Mare Island to Pinole Point. Much dredging has also been done about the mouths of the more important sloughs. The continued stirring of the mud by dredging operations has caused the tides to carry great quantities of silt over the bay and into the mouths of the sloughs, where it has settled to the bottom like a blanket, and almost entirely killed the diatoms and other plant life which form the basis of the food supply of fishes.

This condition was called to our attention by Dr. Albert Mann of the Carnegie Institution after he had made a diatom survey of San Francisco and San Pablo Bay waters. Dr. Mann was alarmed by the conditions he found in San Pablo Bay and stated that if we are to preserve our fisheries we will have to guard against the blotting out of diatom life by silt from dredging operations such as are taking place in our bays and rivers. There can be no doubt that the pollution of the waters by sediment from the dredgers has caused the bass to largely abandon their old haunts about San Pablo Bay. Oil pollution may also be a contributing factor.

AS A GAME FISH.

The striped bass is a very popular game fish in the east, principally secured by surf-casting along the coast of southern New England and Long Island. In various rivers, such as the Potomac, small fish are caught by ordinary bait fishing. The baits employed may be squid, strips of some shiny fish such as menhaden, small silvery fishes, pieces

of crab, preferably "shedders," fiddler crabs, "bloodworms," clams, mussels, etc. Sometimes artificial lures, such as "squid," spoons and even flies are effective. (U. S. Bur. Fisheries Memorandum.)

Along the Pacific coast the striped bass is most often caught in the bays near mouths of rivers, in sloughs and slow moving streams.

To the angler the striped bass is "a gallant fish and a bold biter." It is eagerly sought for by a host of anglers because of the excellent sport offered in its capture as well as the delectable white meat so desirable as food.

Night fishing has been much in vogue, but this fish is such an erratic biter that there is no definite proof that fishing is much better during hours of darkness. Legal restrictions have put commercial night fishing under the ban.

Most anglers claim fishing becomes poorer in streams and sloughs during cold or stormy weather. The fish are supposed to seek the deeper pools at the mouths of streams at such times.

Famous old fishing grounds include San Antonio Slough near Petaluma, Oakland Estuary, San Leandro Bay and Petaluma Creek at Schultze's Slough.

Between 1910 and 1915 Cache Slough and tributaries was a notable fishing ground. During this period Mr. George Neale of Sacramento caught many bass weighing from eight to 35 pounds. Reclamation is responsible for the destruction of this area as a fishing ground.

In the clear water of Prospect Slough on the lower Sacramento bass formerly took the spoon readily, and this was a popular fishing ground for those who enjoyed the sport of catching the striped bass with rod and reel. The usual method was to troll behind a gasoline launch. Large numbers were taken in this manner in other sloughs.

Favorite resorts of anglers in the bay region at present are Sausalito, Petaluma, Napa, Rodeo and Crockett. Baker's Beach, San Francisco, is a favorite for surf-casters. Excellent sport is to be found at the mouth of Elkhorn Slough on Monterey Bay near Watsonville. Bait casting from shore brings results in the same locality.

Striped bass take the hook savagely, make runs and sometimes leap from the water, shaking themselves to be rid of the hook. Then they often go to the bottom to sulk. However, the runs of this fish are not so formidable and persistent as those of the steelhead trout and salmon, and the fish is more easily brought to gaff.

In California the same tackle is ordinarily used as is used for salmon. Trolling usually gives the best results in brackish water, but many are taken from the banks of sloughs with hand lines or casting rods. A heavy sinker keeps the hook near the bottom. Bait hooks, plugs and spinners are used. Squid is one of the favorite baits.

In the east the No. 4 or 5 O'Shaughnessy hook appears to be preferred and the white worm or bloodworm is the favorite bait.

Striped bass reach the Napa River and the sloughs in this section from San Pablo Bay by two passages—Mare Island Straits into Shoal Water Bay and Sonoma Creek into the sloughs northwest of Shoal Water Bay. During eight months of the year, September 1st to May 1st, a great many anglers from all sections of the coast states find sport in this region. Many local residents have barks in the sloughs and motor down Saturday afternoons for the week-end fishing. The lower portion of the Napa River is a favorite place, and at Cutting Wharf

several men have boats to hire for this purpose. Cutting Wharf has been taken over by Napa County and put in first-class condition. Ample parking space for autos with gravelled road approaches and comfort stations are provided. On Sundays from 50 to 75 automobiles are frequently parked at this one spot.

"After the heavy rains when the river is washed out, good bass fishing is to be had as far up as the city of Napa. The fishing in 1924 was better in all this section than in any of the past seven or eight years.

"In bait fishing, sardines, clams and bullheads are considered the best. In the sloughs the bass are accustomed to the drawings from wild ducks, hence this makes good bait, as do also breasts of mud hens and skinned small birds such as linnets, sparrows, etc. Bait hooks are usually 5, 6 and 7 sizes. Many artificial lures are used with success—Stewart and Wilson spoons, Nos. 4, 5 and 6; Basserinos, Redhead and Lucky 13; Heddon Wiggler, dark or light according to whether the water is clear or turbid at high tide. Trolling is best over the mud flat feeding grounds. From half-tide to low, the channels give best results."—Dr. Robert Crees.

Ed. J. Glos of Napa reports conditions as follows:

"During the late fall and early winter of 1924 the writer had very good success trolling for bass in the main fork of the Napa River above Cutting Wharf. The fish taken were of exceptionally good size, running from 6 to 37 pounds, the majority weighing from 12 to 20 pounds. Most of the females were full of spawn. The lure used was Heddon plug of the silver side variety, scale finish.

"When fishing in deep water, best results were obtained by trolling behind a power boat and using at least 100 yards of No. 9 line with no sinker. It is evident that the fish stay in schools, for once the fisherman gets a strike he will, by continuing to work the spot, get a strike nearly every time his plug passes the same place.

"Many of the fish strike very lightly two or three times before striking hard and many times they get hooked on the outside of the head. They seem to strike more readily on fast tides than on slow tides, and mostly on outgoing tides, although many are caught on incoming tides.

"Anglers using live split-tail and whitefish have good success. Dead bait, such as sardines, clams, etc., are also good. The writer has cleaned bass with almost every variety of food in their stomachs—one time even a chicken foot—showing that they eat almost anything."

Erratic fishing conditions in Napa River are thus described by W. P. West:

"When using a basserino in waters below the town of Napa, the fish are nearly always caught somewhere on the head or under the gills, very seldom in the mouth. It is believed that the fish strike to fight and not for food. It has been observed that one year someone will use a spoon and make a big catch. Immediately everyone uses a spoon and good catches are made by all, while apparently fish can not be caught with anything else at the time. In the season of 1923 a spoon was the best troll, while during 1924 spoons proved of no avail but bass plugs brought results."

Thirty years ago, W. P. West caught a good many bass at the town of Napa, ranging from 10 to 16 inches, using cooked shrimp as bait.

"In later years, pollution from garages and tanneries has ruined fishing of all kinds in the vicinity of Napa except when rains have purified the river; then it is possible to catch fish in town for a few weeks out of the year, whereas formerly they could be taken nearly the year around.

"During the fall of 1924 fish died in Napa River within a radius of six miles from the city of Napa. The stench from the thousands of dead fish floating on the water became so bad that it was necessary to chemicalize the carcasses.

"Years ago bass were so numerous in the lower reaches of Napa's sloughs that a man rowing a boat would strike a fish every few minutes with his oars. In recent years bass fishing in these sloughs has been largely abandoned because almost every slough that formerly afforded good fishing has been levied off. This prevents the bass from reaching well protected spawning and feeding grounds, and, if the practice is continued, it will surely prevent future increase of the species."

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A SPINY LOBSTER SEASON AT SAN DIEGO.

BY COBURN F. MADDOX.

At 6 o'clock on the morning of the fifteenth of October, 1923, I hurried to the San Diego water front and the Fishermen's Wharf armed with a "lobster stick" carefully measured off and marked at $10\frac{1}{2}$ inches minimum and 16 inches maximum lengths. This maximum and minimum size limit is set by our California fish and game laws for the taking of spiny lobsters (*Panulirus interruptus*) in season.

This was my first lobster season with the Commercial Fisheries Department of the Fish and Game Commission, and, having heard the talk prevalent on the water front regarding the so-called "lobster fleet," I expected to see the boats come racing in to port as they had done during the preceding albacore season. So imagine my surprise when it was evident that there were no boats "racing" in. It was, in fact, 11.30 a.m. before the first boat of the season, the *Iola*, arrived with a cargo consisting of but two lath wood containers holding but 160 pounds of the delectable crustaceans. These lobsters were alive and of a dark brown color. As they were weighed out by the market man receiving them, they were closely inspected by me. They were then sorted into groups as to size; those measuring from $10\frac{1}{2}$ inches to 14 inches being classed as "smalls" and those measuring from 14 to 16 inches, inclusive, were termed "bulls." The "smalls" bring a few cents more per pound than the "bulls."

The lobsters were then put into metal baskets made of strap iron about an inch and a half wide and spaced about three inches apart. These containers hold 500 pounds and, when filled, were lowered into vats of boiling water containing salt in the proportion of 200 pounds salt to 420 gallons of water—or about a 50 per cent solution of salt and water. After boiling 20 minutes they were lifted out of the vats, a scarlet mass, and dumped out onto a smooth floor, evened out and hosed down with cold fresh water to wash the scum off and partially cool them. When completely dried on the outside and entirely cooled off they were packed in wooden boxes of 100 pounds each ready for shipment to any point in this country by truck or railway express, as they have to be moved quickly when not in cold storage.

The Fish and Game Commission, under a special provision of the law, allows our fishermen to bring in Mexican lobsters after the close of our California season and until the end of the Mexican season, which is usually a month after our season closes, on condition that the captain of a boat whose cargo consists of imported lobsters files an affidavit with the local office of the Fish and Game Commission stating the number of crates (each crate averages 100 pounds) brought into port and that they are lobsters caught in Mexican waters. All imported lobsters may be put into cold storage to be sold during the closed season, provided they are first punched through the tail with the mark of the company or respective market putting them in cold storage. For example, the Star Market marks their lobsters with a star shaped punch, another market has a "V" shaped mark, etc.; any mark being used that will make a legible, clean cut in the tail of the lobster and one not being used by any other market or company. In this way

if any lobsters need to be identified it may be easily done by looking at the list of marks filed with the Fish and Game Commission.

Naturally a portion of the imported spiny lobsters die in transit, and these dead lobsters are sprayed with coal oil and turned over to an independent fertilizer plant to prevent them being sold as "seconds" to the unsuspecting public.

After being punched and packed in wooden boxes, 100 pounds to the box, it is necessary, when shipping out during our closed season, that each box be protected by a permit pasted on it; said permit having on it a number, the name of the market making the shipment, the mark with which the lobsters contained therein are marked, the date of shipment and the signature of the local fish and game deputy on duty at the port of entry. This permit shows any transportation company that the lobsters have been duly inspected, as they are not supposed to accept for shipment any fish or game out of season, and this permit is insurance to the shipper that his shipment will not be opened for inspection en route to its destination.

When it is taken into consideration that it has been shown by scientific investigation that an average spiny lobster is probably between seven and a half and ten years of age before he attains the legal minimum length of ten and one-half inches, one realizes that unlimited catching of this kind of crawfish would soon result in their extermination. The fact that California has never allowed the canning of our local spiny lobsters has greatly helped to save the species from extermination. Fortunately for conservation, the only attempt ever made to can imported Mexican lobsters, an attempt made in San Diego, was unsuccessful due to the process used and the difficulty and cost of importation.

I have described the method universally used in California for handling, cooking, transporting and importing these delicious shellfish which are in great demand by people generally within the state and by the winter tourist element especially. These crustaceans are not only pleasing to the palate but they please the eye as well, for they are usually served broiled on the half shell, and the contrast of the pure white meat with the scarlet red of the shell, the result of cooking, is most attractive.

The season, the start of which I depicted in the beginning of my story, resulted in the receipt of 67,948 pounds by the end of the month of October and 127,635 pounds by the end of our California season, the last day of February, and 746,959 pounds by the end of the Mexican season, April 15th. These figures are put in to give the reader an idea of the volume of business carried on in these shellfish during an average season.

This method of handling local and imported lobsters helps to prevent the depletion of our local lobsters, which a few years ago had become more or less marked. At the same time it prevents any violation of our laws by importers of foreign lobsters.

THE CALIFORNIA RING-TAILED CAT.

By WALTER FRY, in charge Nature Guide Service, Sequoia National Park.

The California ring-tailed cat (*Bassariscus astutus raptor*) is one of the most remarkable animals of the Sequoia National Park. Owing to nocturnal habits it is seldom seen by park visitors, but when once seen it is remembered because of its grace, varied coloring and almost human facial expression of kindness. This cat belongs to the raccoon family; the body length is about 15 inches, and a round slim tail of nearly the same length is heavily furred to the tip. The body is slender; legs short; height about nine inches; weight about two and one-half pounds; ears broad, one and one-half inches, scantily haired; eyes large, mild and expressive. The fur is strikingly marked with black, white, brown and gray.

The ring-tailed cat ranges from Costa Rica on the south northward through Mexico and Texas, thence on to Colorado, southern Utah, Nevada, and Oregon on the north. Throughout its range it seeks the warmer climates, as it is not well adapted for cold weather. In places it is fairly abundant, while elsewhere it is very rare and in many places wanting. In California this mammal is not plentiful anywhere, but inhabits the Upper Sonoran Zone, usually below 5500 feet, along the western slopes of the Sierras. In other localities the zonal range differs greatly from that in California; in Oregon it is at sea level, while in Mexico it is from sea level up to 10,000 feet.

The California ring-tailed cat is strictly nocturnal in habit and wanders far and near in quest of food, eating almost anything that comes its way. The principal food here is rats, mice, gophers, birds, frogs, lizards, berries, fruit and many insects. Although the animals can run somewhat rapidly and climb trees quickly, they seldom catch their prey except by stalking. These animals hunt alone. I have never heard them give voice except when pursued closely or captured. When approached they will give a short quick bark similar to the California gray fox, and when captured they utter a shrill cry of fear and rage.

The breeding season for this locality is April to June. The young are three and four in number and probably only a single litter is produced each year. The animals den in rock crevices, under logs and in hollow trees. In these dens, on beds of dry grasses and leaves, the young are born with eyes closed. Their bodies are covered with downy fur, lighter in color than that of the adults, and the tail bands are scarcely visible. When six weeks old the young come out of the den and at two months they go on nightly hunts with their mother. The mother weans them at the end of the third month and leaves them to shift for themselves.

I have had many interesting personal experiences with these animals and find them intelligent, bold and inquisitive. They are not combative and they respond quickly to kind treatment, making fine pets.

On May 25, 1906, while I was camped at Rocky Gulch, Sequoia National Park, I saw two beautiful specimens of these cats, an adult male and a female. Both were so good-natured and gentle that it was only necessary to feed them a few times to induce them to come into the cabin with me. They became so tame that they would eat from

my hands, climb into my lap, and sleep in a bed that I prepared for them in the cabin. A few days after my arrival the female had three kittens, about the size of newly born house cats. For two or three days the mother would not permit the father to come near them, but later the family occupied the one bed. The kittens grew rapidly, and when three weeks old the parents began to carry food to them; at the age of about eight weeks they accompanied their parents on nightly hunts, returning to the cabin in daytime. Later I was relieved by a detachment of soldiers, who also made pets of the ring-tail family so that they became as tame as any house cats.

Scarcely any other wild animal has as many names as the ring-tailed cat. In the United States it is known as "ring-tailed cat," "miners' cat," "coon cat," and "band-tailed cat." In Mexico it bears the name of "cacomixtle," except in Lower California, where it is the "babisuri." Despite this nomenclature the animal is not related to the feline family, but is akin to the raccoons. All the common names in the United States are gradually giving way to that of "ring-tailed cat." While this common name is not well chosen, as the term "cat" properly belongs to the feline family, it is now too firmly established to be dislodged.

Will the ring-tailed cat continue to thrive and hold its own under existing laws? Positively, it will not. The animals have no protection except in the national parks; but as the park areas comprise but a small portion of their range the protection from this source is but meager. Outside the parks these pretty animals are being depleted from year to year by the ever-increasing number of fur trappers. The animals in the neighborhood of the Sequoia National Park are not half as numerous as they were ten years ago. They are not endangered on account of their fur, as it is not high on the market; but as the trappers make their sets for other animals of higher fur value, the ring-tailed cats are constantly getting into their traps and are killed and taken along. While the animals are not in danger of immediate extinction in California, I do consider that it will soon become necessary for the state to furnish adequate protection or we shall lose this beautiful California mammal.

It is not safe to upset the balance of nature and destroy the many species of mammals, birds and harmless snakes which prey on rats, mice, gophers, ground squirrels and other vermin. The ring-tailed cats, the badgers, the skunks, the raccoons, and even the coyotes are men's best friends; while as to the hawks and snakes, they destroy hundreds of vermin for each domestic bird taken. Let nature alone and there will be little need to spend millions to poison and to trap vermin. As it is now, the poison and traps put out only too often destroy as many friends as enemies.

The campaign against vermin is too often foolishly and thoughtlessly conducted; and when there is a financial reward for men to trap and poison, the facts of natural science are neglected. Man is but slowly emerging from the savage state when the lust to kill was among the strongest of his instincts. It is easy to appeal to this instinct by labeling animals as "vermin" to be destroyed without proper consideration of the many biological factors involved.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

July 19, 1926.

Enterprising enough to be progressive.
Conservative enough to be safe.

A STRIPED BASS NUMBER.

No introduced fish in the waters of this state has attracted so large a following of devotees as the striped bass. Angling for thousands, to say nothing of the tons of fish which reach the markets of the state, was made possible by the introduction of about one hundred and thirty-five striped bass secured in the Navesink River of New Jersey, and planted in Martinez Straits near Martinez, together with a later plant of three hundred fish made at Army Point near Suisun. Devotees of the sport throng the trains each week, and Bakers Beach in San Francisco is regularly lined with surf casters. Similar sport is afforded on the larger streams both north and south of San Francisco.

An attempt has been made to furnish those interested with some reliable information on this notable food and game fish. That some features of the article will call forth considerable debate is certain, for as one old time angler put it: "I have fished for striped bass continuously for twenty years and yet I know practically nothing about this fish." Many an angler has found his pet theory upset, not once, but many times. Admittedly the striped bass is erratic in its habits, and what may happen in one place does not always hold in another.

But one point of view has been attempted—that held by the scientist who may many times have little actual field experience, but who is skilled in the compilation of dependable data. That of the angler himself who often depends entirely upon field observation remains to be presented at some future time.

We warn all readers who find this

number of particular interest to place his copy in safe keeping, for, judging by past experience, special numbers of this kind are quickly exhausted, and impossible to replace.

PLAN DETERMINATION OF AGE AND RATE OF GROWTH OF STRIPED BASS.

Complaints of decrease in the abundance of striped bass have led the Commercial Fisheries Department to undertake a basic investigation regarding the life history and habits of this fish. Under the direction of Professor J. O. Snyder of Stanford University, an effort is being made to determine the age and rate of growth of the striped bass by a study of the scales. Measurements and scale studies are already helping to answer the questions as to whether the striped bass migrates to sea every year with a return movement for spawning and as to the age when this fish becomes mature.

TROUT TACKLE FOR STRIPED BASS.

In connection with striped bass fishing, we think of heavy tackle. Casting rods are used extensively. However, whenever there is a run of small sized bass in the Napa River, many obtain thrilling sport by using trout rods. The best class of sportsmen are always seeking refinements in modes of angling, and this is, perhaps, a step forward. Certainly it takes greater skill to successfully land a striped bass with trout tackle.

CONVENTION OF FISH AND GAME EMPLOYEES.

On March 5 and 6, 1926, the employees of the Fish and Game Commission for the first time got together for a conference. Friday was given over to civil service examinations and to a visit to the University of California. On Saturday all day sessions were held ending with a banquet in the evening. The program was educational in nature and the outstanding features were the attendance at the afternoon meeting and the banquet of Governor Friend Wm. Richardson, the presence of Dr. H. J. Donaldson, president of the Pennsylvania Game Commission, and the opportunity afforded for employees to really know and appreciate the splendid commissioners who direct the work of conservation, and their competent executive officer. Everyone concerned was impressed with the splendid body of men who enforce the fish and game laws of the state, and a fine spirit prevailed throughout the meetings. Never was there a more united approval of a project nor a more imperative demand for a meeting

of the same kind to be held annually. The commonest comment made was, "this should have been done long ago."

On March 7th, automobiles took the men to the new Yountville Game Farm in Napa County where a picnic lunch was eaten on the grounds. Superintendent Bade of the game farm conducted the men about and furnished much valuable information.

BRIEF REPORTS ON CURRENT ACTIVITIES WILL APPEAR UNDER NEW DEPARTMENT HEADING.

It has always been the policy of this magazine to attempt to bring to its readers the current activities of the Fish and Game Commission. A series of monthly reports from various department and bureau heads now make it possible to add a new department to the magazine under the heading "Commission Activities." (See p. 101.) In this department will be found statements pertaining to the plans of and accomplishments of the commission.

SCREEN AND LADDER CONFERENCE.

On March 31 there was held at the executive offices one of the most important conferences ever attempted by the commission. By invitation there assembled representatives of practically every power company in California, interested officials of irrigation districts and irrigation companies, and private individuals charged with the maintenance of screens and ladders in California rivers and streams. The purpose of the meeting was contained in the following letter addressed to these persons by the executive officer:

The Fish and Game Commission, is desirous of calling a conference of power companies, irrigation districts, private water companies, and individuals interested in the maintenance of screens and ladders in California streams.

In the past considerable friction has existed between the Commission and the various persons and companies affected, and it seems that the time is now opportune to settle old difficulties and plan to cooperate for the future.

With this end in view, the officials of the Commission charged with the duty of enforcing screen and ladder laws feel that a general and free expression of opinion on both sides of the question will bring immediate results and clear up the situation. We desire to inaugurate a policy for the future and ask your aid and suggestions. It seems to us that there is no necessity for any antagonistic attitude on either side and with these objects in view, we earnestly ask you to be present at a conference to be held in the office of the Fish and Game Commis-

sion in the Postal Telegraph Building, San Francisco, on Wednesday, March 31, 1926, at 10 o'clock a.m.

Will you kindly indicate to the undersigned whether some person will be at this conference to represent you?

A splendid attitude of cooperation was shown by the engineers who assembled. The point which brought out most discussion was as to the feasibility of screens in certain types of streams. It was definitely pointed out by the representatives of the Fish and Game Commission that judgment as to whether a screen is needed or not would not be ceded to any committee but that this judgment is entirely in the hands of the Fish and Game Commission. The main need so far as the commission is concerned is engineering advice as to the selection of the particular type of screen to be used under given conditions and wholehearted cooperation in the enforcement of the screen and ladder law.

As a result of the meeting two committees were appointed to work with the experts of the commission. The committee for the power companies, the high stream diverters, is made up of G. H. Bragg, chairman, Pacific Gas and Electric Company, W. H. Dennis, Southern California Edison Company, H. K. Fox, San Joaquin Light and Power Company, W. L. Huber, Southern Sierra Power Company. The committee representing the irrigation districts, low stream diverters, G. H. Atherton, Delta Farms Company, Stockton, W. L. Combs, South San Joaquin Irrigation District, and William Durbrow, Glenn-Colusa Irrigation district.

These committees are to report some time in the future as to their findings.

There is no necessity for an antagonistic attitude on either side, and it was impressed on the gathering that the commission is more than willing to cooperate, in every particular, to the end that the laws affecting fish screens and ladders may be enforced without working a hardship upon anyone.

CALIFORNIA MAN APPOINTED ON ADVISORY COMMITTEE ON FISHERIES.

In recognition of his accomplishments in fisheries conservation work in California, N. B. Scofield, in charge of the Department of Commercial Fisheries of the Fish and Game Commission of California, was accorded an exceptional honor by Secretary of Commerce Herbert Hoover when he was selected to serve as one of the five members of a recently appointed advisory committee on scien-

tific investigations for the United States Bureau of Fisheries. In creating this board it was Secretary Hoover's object to bring together a wide range of interests particularly able to advise Commissioner of Fisheries Henry O'Malley in the scientific program of the bureau in order that it may give the most adequate results for the needs of the fisheries throughout the country.

During the past ten years as director of the commercial fisheries work for the State of California, Mr. Scofield has built up a program for the conservation of the fisheries which far surpasses that of any of the other states. Under his direction a state fisheries laboratory has been established, and the quality of the work being carried on by its corps of research workers has been recognized by our federal government to the extent that two members of the staff, Elmer Higgins and O. E. Sette, have been chosen as division chiefs for the United States Bureau of Fisheries, while Will F. Thompson was selected from there to direct the halibut investigations for the International Fisheries Commission.

Mr. Scofield has been active in the promotion and enforcement of fisheries legislation and has gained particular recognition in his efforts during the past seven years to conserve the sardine supply by preventing the unrestricted use of fish fit for human consumption in reduction plants.

A NEW INTERNATIONAL FISHERIES COMMISSION.

Word was received on April 28 that as the result of a new Mexican treaty an International Fisheries Commission of four members has been appointed by President Coolidge. As one of the members of the commission, the president selected Mr. N. B. Scofield, in charge of the Commercial Fisheries Department of the California Fish and Game Commission. The other American member of this commission is Henry O'Malley, chief of the Federal Bureau of Fisheries, and the Mexican appointees are Jose R. Alcaarez, chief of forest service, and Carlos E. Bernstein, in charge of fisheries in the Gulf of California district. The duties of the new commission are as follows:

"To aid the labors of corresponding agencies in the nations represented in conservation measures.

"To prevent smuggling of marine products.

"To make recommendations relative to revenues upon imports and exports of fish."

This is the second honor to be conferred upon Mr. Scofield within the past few months. The commission takes pride in the fact that Mr. Scofield's ability has been thus recognized. It is expected that even though his new duties may separate him from direct service with the Commercial Fisheries Department he will continue to act in an advisory capacity.

THE NEW YOSEMITE HATCHERY.

A hatchery in Yosemite National Park has been agitated for some time. Once complete plans had been drawn and construction work practically started, difficulties arose which postponed construction. During April, 1926, at a meeting held in San Francisco, an agreement between the National Park Service and the Fish and Game Commission was drawn up which provides for the lease of land in Yosemite National Park and the construction thereon of a hatchery building, and rearing ponds. The agreement also provides for the erection of an aquarium for the display and exhibition of various species of fish. The contract holds for the term of ten years with provision made for renewal.

As originally contemplated, the hatchery was to be built of stone and was to be located near the confluence of Illillouette Creek and the Merced River.

From an educational point of view a hatchery could not be located in a better place. Over two hundred thousand visited the park last year and when the new road is open the numbers will probably double. Many of the thousands of visitors would gladly make use of an opportunity to see a fish hatchery in operation. Persons having seen the methods used in fish propagation would become more interested in fish conservation.

VIOLATORS TAKE NOTICE!

The new dollar-a-year deputies recently appointed by the Fish and Game Commission will have full powers to enforce the fish and game laws. Furthermore, the names of these men are to be kept secret with a definite purpose in view. Many a violator this coming year will rather suddenly wake up to the fact that the man near him on the stream or the hunter in the next blind is a full fledged game warden when he is suddenly arrested for having more than the limit of fish or of ducks.

Most of the regular deputies are marked men so far as the violator is concerned, but it will take some time for the violator to become acquainted with all of the dollar-a-year men which have been appointed.

We wonder whether there are many other instances where men are sufficiently enthusiastic about a natural resource to be willing to do the "dirty work" of law enforcement with no greater incentive than that of helping to conserve a natural resource.

NEW REARING PONDS CON- STRUCTED.

Heretofore it has been the policy of the Fish and Game Commission to hold and feed trout at the hatcheries until about two to three inches long before planting; now plans are being made to hold some fingerlings until three and one-half to five inches long and then liberate them naturally in various streams.

Hatchery in Humboldt County will care for 100,000 fish.

Other western states have experimented with the pond rearing system for several years, and this year California will take a foremost place in experimentation of this kind.

OUR GREAT TASK.

With the ever-increasing population of our state, the easy accessibility of our forests and streams caused by the building of highways and trails and the use of the greatest destroyer of life, both human and wild animal—the automobile—we have a hard and never-ending task before us to protect the remaining animals and fishes of our state. Forty years ago there



FIG. 18. Black-tailed deer feeding in a meadow in Monterey County. Photograph by William Jeffrey.

The plan contemplates the construction of fifteen rearing ponds which will accommodate about 2,700,000 small fish. In most instances these ponds will be built along side of some mountain stream that needs constant stocking and the young fish will be cared for by experts.

Local sportsmen's clubs are planning the construction of four of these holding ponds. One such pond, to be built in Castle Creek near Dunsmuir, Shasta County, will accommodate 150,000 fish. Two such rearing ponds will be located in the Tahoe region; one of them to be the largest of all with a capacity of 400,000 fish. A new pond at the Fort Seward

were more fish and game in one county in California than there are now in half the state. When I began to study the problem of conservation as a boy and young man, forty years ago, there was only a population of 800,000 in the entire state, and no one advertised California as the sportsmen's paradise at that time, for the elk and antelope were practically exterminated and a marked depletion was already noticed among the fish in our inland waters as well as among the smaller game animals and birds. Now, with a population nearly five times as great, and everybody looking to the great out-of-doors for pleasure and recreation.

and the capitalization of our wild life by writers and advertisers urging the whole world to come to California, we are facing a stupendous task. We can only hope to keep what is left of our wild life by working earnestly for a shorter hunting and fishing season and using all our efforts to meet the new policy of cooperation and friendly relationship in the great task before us.—W. H. Shebley.

PIECING OUT THE BAG LIMIT.

It seems almost incredible that certain so-called sportsmen continue to piece out their bag limits. It was reported to us recently that a man made this statement: "The early morning flight was almost entirely of small ducks. I secured my limit but just about this time the big ducks began to come in and, desiring some good mallards, I continued to shoot. Each time I secured a mallard or a sprig I took a small duck out of my bag and threw it into the water, thus returning with a legal limit of large ducks."

It is also well known that some men, certainly we can not call them sportsmen, while shooting quail with a pump gun kill a large number of birds and then without spending much time to search for them continue to kill enough birds so that they secure their limit without any extra exertion in searching for lost or wounded birds.

Even falling back on "the spirit of the law" does not excuse *waste*.

HUNTING ACCIDENTS—1925.

As in past years a compilation of hunting accidents for the year 1925 has been attempted. Unfortunately accurate data relative to such accidents are not available from the Bureau of Vital Statistics. It has, therefore, been necessary to make

the compilation from newspaper clippings which have reached our office. This method is certain to allow of error and furthermore does not give a complete check on the number of hunting accidents, in fact, it seems doubtful whether more than two thirds of the accidents in the state are actually accounted for by this method.

In spite of the acknowledged inaccuracy the compilation should bring vividly to the mind of every user of a gun that he is handling a weapon which is potentially dangerous to human life. As has been suggested before, the work of compilation is worth while if it will put to shame those responsible for accidental shooting of fellow humans, and awaken others sufficiently to handle their weapons with more care.

The huge toll taken annually in the United States is stirring many states to act, and compilations are made and wide publicity given in almost every state. The Game Commission of Pennsylvania not only tabulates the hunting accidents of that state under fifteen different headings, but is collecting data from all other states. The more populous a state grows, the more certain is a large crop of hunting accidents annually as is evidenced by the fifty-two fatal and 229 non-fatal accidents recorded in Pennsylvania for 1925.

Everyone admits that most of these accidents are preventable and consequently education along the lines of careful handling of a gun should be the most effective means of prevention.

This past year, there were several accidents due to a loaded gun in a motor vehicle. In some states it is made a misdemeanor to carry a gun in an automobile unless it is unloaded and disassembled.

HUNTING ACCIDENTS, 1925.
Killed.

Name	Shot by	Date	Locality	Circumstances
Abrew, Tony A.	Self	Dec. 17, 1925	Ryde.	Shotgun accidentally exploded, charge entering abdomen.
Bruere, Samuel (33)	A. F. Gilbert	Dec. 17, 1925	Yreka, Siskiyou County	Shotgun discharged when it caught in clothing, shattering victim's left leg.
Calvin, A. Raymond (30)	Self	Dec. 9, 1925	Grass Valley, Nevada County	Rifle in truck accidentally discharged, shooting victim through the body.
Cuneo, Angelo P. (14)	Self	Sept. 27, 1925	Clinton, Amador County	Shotgun fell from seat of auto, charge striking victim in face and abdomen.
Hanson, Peter (16)	Self	Dec. 1, 1925	San Rafael	Shotgun discharged when accidentally dropped.
Hemphill, B. (64)	Virgil Ward (28)	Dec. 1, 1925	Korbel, Humboldt County	Shot in back when companion stumbled and accidentally discharged rifle.
Hinds, Archibald F. (13)	Self	Oct. 27, 1925	Atwater	Shot in head with rifle while crawling through fence.
Imperatrice, James	Self	Oct. 27, 1925	Gustine	Shotgun accidentally discharged while cleaning.
Luttrell, Bernard L. (27)	Self	Oct. 12, 1925	Moffatt Creek, Siskiyou County	Trigger of rifle caught on twig when descending tree, shooting off side of head.
McCauley, Al	Self	Sept. 7, 1925	Mina, Mendocino County	Rifle accidentally discharged while being used to assist in climbing steep bank.
McGee, David Porter (21)	Francis Kendall	Sept. 5, 1925	Redding, Shasta County	Shot in back by companion carrying rifle with trigger cocked.
O'Hare, Roy (18)	Self	Oct. 15, 1925	Corning, Tehama County	Shot in chest by shotgun while crawling through fence.
Pratt, Samuel	Self	Jan. 12, 1925	Red Bluff	Gun accidentally discharged when victim handed shotgun to companion.
Reed, Rolan (19)	Jack Dalton	Jan. 2, 1925	Sacramento	Companion's rifle accidentally discharged while cleaning, shooting victim in stomach.
Salvini, Pete	Self	Oct. 27, 1925	Lincoln, Placer County	Shotgun accidentally discharged shattering right hand and tearing away side of face.
Solaro, Louis (23)	E. M. Goodbar		Pittsburg	Shot in the head by companion firing at flock of ducks.

HUNTING ACCIDENTS, 1925.

Wounded.

Name	Shot by	Date	Locality	Circumstances
Andrus, William (22)	Companion		Coloma, San Mateo County	Flesh wound in leg caused by accidental explosion of rifle being loaded by member of hunting party.
Bartholm, G.	Self		The Geysers, Mendocino County	Rifle discharged while crawling through fence, causing bad wound in left forearm.
Bartels, R.	Self	Sept. 9, 1925	Orland, Glenn County	Victim fell on slippery ground, discharging rifle and causing painful wounds in left foot.
Beall, Ernest	Self	Nov. 16, 1925	Stockton	Shotgun burst, injuring left hand.
Bloch, Emile (14)	Harry Cramer (13)	Nov. 16, 1925	Dry Creek Valley, Sonoma County	Shot in head by companion who mistook him for a rabbit.
Braudenberg, Orayne (17)	Jack Dalton (19)		Sacramento	Revolver discharged accidentally while being cleaned, striking victim in chest, seriously wounding him.
Breakenridge, Harold (19)	Jesse Cave	Nov. 9, 1925	Berkeley	Victim shot through the neck when Cave snapped the trigger of a rifle which he supposed was not loaded.
Callander, W. C.	Self	Oct. 9, 1925	Chico, Butte County	Injury not serious.
Carpenter, Cecil (18)	Self	Dec. 12, 1925	Girdley, Butte County	Shot in heel when rifle was accidentally discharged.
Casagrande, Louis	Charles Reynolds (15)	Aug. 5, 1925	Cloverdale, Mendocino County	Shotgun accidentally discharged, tearing hole in left breast.
Cavezas, Rigo	Self		Berkeley	Companion stumbled over a limb, discharging rifle, bullet passing through back and abdomen.
Crowley, Charles	Herbert Williams	Sept. 9, 1925	Yuba River Bottoms, Sutter County	Shot in leg while cleaning shotgun.
Daily, Clifford	Companion	Sept. 7, 1925	Trinity Mountain, Trinity County	Trigger of companion's gun caught on twig, charge wounding victim in left shoulder.
Fiske, Herbert	Unknown hunter	Sept. 10, 1925	Medicine Lake, Siskiyou County	Companion shot at deer, causing several bullets to enter Daily's shirt sleeves. Not injured.
Germond, Ramona (26)	Self	Sept. 23, 1925	Fresno	Shirt and coat shot full of bullet holes.
Greco, John	Self	Nov. 9, 1925	Lathrop, San Joaquin County	Shotgun accidentally exploded while hunting, causing wounds in both legs.
Hanson, Jimmy (16)	Self	Nov. 30, 1925	San Rafael	Shot of left hand while holding it over the muzzle of his shotgun.
Mack, Ernest	Unknown hunter	Sept. 10, 1925	Auburn, Placer County	Shotgun accidentally discharged while hunting.
Mason, Jay R.	Earl Badger	Nov. 30, 1925	Redding, Shasta County	Bullet fired by unknown hunter ripped through wind-shield of machine, striking victim in chest.
Mills, Walter (14)	Self	Oct. 11, 1925	Pacific City, San Mateo County	Companion in falling discharged rifle, shattering both bones of victim's left leg.
Murphy, Warren (17)	Self	Sept. 16, 1925	Wawona, Mariposa County	Shotgun dropped accidentally, charge shattering boy's chest.
Nevis, Lloyd (7)	George Nevis		Sacramento	Rifle became clogged, victim hammered it with a rock, causing it to explode, destroying left eye.
Ramsey, Levi (16)	Companion	Sept. 5, 1925	Napa, Napa County	Brother cleaning shotgun accidentally discharged it, causing serious injuries.
Russell, George S.	Party of hunters	Oct. 22, 1925	Cloverdale, Mendocino County	Victim hit in body when shotgun accidentally discharged. Party of four poaching hunters seeing feather in victim's hat opened fire, causing shot to enter head.

HUNTING ACCIDENTS, 1925—Continued.

Wounded.

Name	Shot by	Date	Locality	Circumstances
Shaw, Walter S.	Self		Sacramento	While pointing at birds, shotgun held on running board accidentally discharged, shooting off three fingers of right hand.
Shrader, William	Ray Brown	Sept. 5, 1925	Paskenta, Tehama County	Victim mistaken for deer; right arm shattered.
Sperry, George and Willis (14)		Sept. 5, 1925	Napa, Napa County	Shotgun accidentally discharged at camp, striking George in side of head and wounding Willis severely in the arm.
Tantau, William	Self	Dec. 21, 1925	Redding, Shasta County	Shot in foot while quail hunting.
Thompson, A. J.	— Buckman	April 24, 1925	Groveland, Tuolumne County	Victim mistaken for deer; right thigh shattered by shot.
Willie, M. J.		Nov. 7, 1925	Oakland, Alameda County	Shot by unknown hunters, receiving several birdshot wounds.
Wright, Edward A. (21)	Self	Sept., 1925	Berkeley	Shotgun slipped and discharged; shots perforating abdomen caused serious injury.

HUNTING ACCIDENT DATA 1924 AND 1925.

	1924	1925
Number persons hunting	250,000	*250,000
Number persons killed	15	16
Number persons wounded but not killed	22	32
Number self-inflicted accidents:		
Fatal	8	11
Nonfatal	13	15
Number accidents inflicted by others:		
Fatal	7	5
Nonfatal	9	17
Occurred while hunting large game (elk, deer, bear, etc.):		
Fatal	2	7
Nonfatal	6	13
Occurred while hunting small game:		
Fatal	12	9
Nonfatal	16	16
Occurred while hunting unknown game	0	3
Weapons causing accidents:		
Rifles	9	20
Shotguns	27	27
Revolvers (including pistols)	1	1
Unclassified	1	0
Where occurred:		
In fields or on waters	25	25
In forests	6	15
In conveyances	3	3
Unknown	2	5
Number injured or killed in mistake for game or other wild creatures, if known:		
Killed	1	0
Wounded	2	5

*Approximately.

Boys under 18 years of age responsible for an undue percentage of the injuries or deaths, about 20 per cent.

DISTRICT ATTORNEY WARNS HUNTERS.

Prior to the opening of the hunting season last fall the district attorney of Trinity County issued a statement that he would hold hunters to strict accountability if they killed or wounded other hunters. In this stand he was supported by the Forest Service.

Supervisor B. H. Mace addressed the following communication to all district forest rangers under his jurisdiction:

"In order to reduce to a minimum the liability of accidental shooting of human beings for deer or other game animals, the district attorney of Trinity County has decided to call every person responsible for accidental killing or injuring to strict account.

"In all cases arrests will be made and the party required to explain the circum-

stances of the accident in court. Therefore, in order to cooperate fully with the authorities in this commendable stand, I should be glad to have you instruct all fire guards to take prompt action if a case of accidental shooting in Trinity County comes to their attention in order that the responsible party may be detained until the arrival of the county officers."

THE ISSUE OF THE RANGE.

Conservationists everywhere have been incensed at the attempt of western stockmen to obtain additional concessions in the national forests. At a recent meeting of the Fish and Game Commission resolutions opposing the bill now before congress were sent to California senators and congressmen.

The stockmen are seeking the following concessions:

1. Reduction of the grazing fees on the national forests to rates equivalent to the government's cost of administration. This would mean \$3,000,000 from the annual revenue of the national forests.

2. A legal status to grazing on the national forests.

3. Authorization of the creation of a commission with authority in grazing affairs superior to that of the Secretary of Agriculture.

4. The turning of unreserved public lands, aggregating 183,000,000 acres, over to the states or have them regulated by the federal government.

If these concessions are granted, the stockmen will acquire a property right to grazing lands, which will figure as a very serious menace for conservationists to combat.

WILD TURKEYS TRIED IN SAN DIEGO COUNTY.

Last year the San Diego Fish and Game Protective Association secured some wild turkey eggs from Louisiana. These eggs were sent to the San Diego Zoo, but as it had no setting hens with which to raise them, they were turned over to Mr. Glazier, who has a ranch at El Cajon, California. Seven of the nine eggs hatched. The young grew to be large as the ordinary tame turkey, and became quite domesticated. One of the turkeys was killed by a lynx, another injured so badly that it died soon afterwards. The remaining five were then sent to a new game farm near Otay dam south of San Diego where an attempt will be made to raise more this year.

WATER POLLUTION.

So many instances of the pollution of the rivers and harbors of the state have

come to the attention of the Fish and Game Commission that the commission has organized a special bureau to investigate and secure evidence of pollution. An experienced man, Mr. Rolin G. Watkins, heads this bureau and he will conduct a survey of the entire state. Owners of broken oil or gas pipe lines, distilleries, factories or other public utility corporations discharging refuse or poisonous matter into the waters of the state will be held to answer in the courts. No favors will be shown.

That the courts stand ready to help in preventing water pollution is evidenced by the fines which have been imposed in two recent cases where oil and other refuse was being pumped into San Francisco Bay.

may lose what you thought was a friend but you will be helping your game warden and may be making one less offender for him to watch.

A NEW POLLUTION PROBLEM.

The opening of the season on cormorants and the white pelican has not only started up considerable opposition among bird students, but is becoming the basis of a new pollution problem. Many hunters accept such an opportunity to utilize large conspicuous birds as a mark, shooting "for the fun of it." Instead of retrieving the birds, they leave them to decay and rot in the lakes and streams. The surfaces and shores of certain lakes are lined with the bodies of such dead



FIG. 19. Wild turkeys reared for the San Diego Fish and Game Protective Association by Mrs. Guy O. Glazier. It is the intention of the Association to stock the Cleveland National Forest Game Refuge in San Diego County.

THE BEST GAME WARDEN.

It is impossible for the game warden to catch every offender, so why not help him? People are governed to a great extent by what the other person may think of them. When your neighbor comes in with more than the bag limit, do not admire him for being a good shot, and for being clever enough to put it over on the game warden, for then you encourage him. Tell him the truth instead. Point out he is breaking the law, explain why such a law was passed, and if he is a true sportsman he will appreciate your frankness. If not, you

birds with the result that the drinking water is contaminated.

Considerable complaint has come from San Diego County where there are several large storage reservoirs and where these unprotected birds have fallen to the duck hunter's gun. At Cuyamaca Lake, forty-eight dead birds or hopelessly crippled birds were counted within 300 yards of the shore line.

Certainly it should not take more than a statement of this kind, brought to the attention of duck hunters, to stop this wanton slaughter with its consequent pollution of drinking water.

A RARE TROUT FROM LOWER CALIFORNIA.

The rare Nelson's trout was recently found by members of a scientific expedition from the University of California in the Santo Domingo River, Lower California.

Mr. Chester C. Lamb, Assistant Curator of Mammals, Museum of Vertebrate Zoology, who participated in securing the collection, has this to say regarding *Salmo nelsoni*:

"So far as known, only one stream in Lower California is inhabited by trout, namely, the Santo Domingo River. This stream heads on the west slope of the San Pedro Martir Mountains, and the trout exist chiefly in one of its branches, San Antonio Creek, and in that branch almost altogether above Rancho San Antonio. At the time our fish were collected, it is believed that the species existed in only about five miles of the course of the stream, for the reason that at least 15 miles of the lower course was, at that season, dry. About five miles above Rancho San Antonio are waterfalls above which no trout are known to occur.

"There are persistent rumors to the effect that sooner or later the waters of this stream are to be diverted for power purposes from a point above those falls, in which case, unless the trout be transplanted to other waters, the species would become extinct. It is believed that there is no other stream in the region that affords permanent flowing water, such as the trout could survive in."

The cañon of the river in which these trout live is narrow and deep, and the water, according to Mr. Lamb, at times becomes warm. Insect life, too, is plentiful. The trout were found to be exceedingly abundant and easily caught. About 150 were taken on two fly hooks, one a brown hackle and the other a royal coachman.

The presence of this trout in this southern stream is explained in that favorable climatic conditions probably once existed which allowed trout to extend their range. In fact the rainbow's ability to migrate through salt water makes establishment in any large stream possible. After a very close comparison with the other species of trout it has been found to bear a great resemblance to the rainbow trout in that the size and number of scales is almost the same. The coloring also is very similar. This trout is best accounted for as a geographic race, its slight variations from the rainbow trout being explained by its

isolation from all other fish and adaptation to new conditions. A discussion based on sixty specimens of this race, *Salmo nelsoni*, by J. O. Snyder of Stanford University, may be found in Univ. Calif. Publ. in Zool., vol. 21, no. 17, pp. 419-426.

MEAGER INFORMATION ON GAME VIOLATIONS LEADS TO CONVICTION.

On the fourteenth day of January, 1926, I received a report as follows: That Ray Taylor of Susanville was going from one to another here in town, and asking them if they wanted to buy a quarter of venison for \$7.50 a quarter, telling them that it was good meat and that Bert Bristol had bought a quarter. The report also went on to say that the deer were being killed in the Milford section of Lassen County. I received this report some three or four days after the meat had been sold and thought that it was too late to find any of the meat around town. It was not known who killed the deer or the exact place where the violations were going on. I laid a trap to catch the parties who were coming in to sell and deliver this deer meat, but I did not get any results. It seemed as though they were not going to bring in any more meat to sell at present.

On January 22, 1926, I drove to Milford and saw Forest Ranger Bruce Torgny and told him what I was looking for. I asked him if there were any trappers in that section trapping and hunting. He did not know of any. However, he told me that he was into Meadow View Station on the twelfth of January and that he met a party of three coming out in a Star touring car. He said there seemed no reason for anyone to be in there unless they were hunting at this time of the year. We decided to go there and see if we could find out what they were doing in there, as we could easily find their tracks in the deep snow. We made the trip in there the next day, but found nothing that would give us anything to work on and returned to Doyle. Here I saw one of my sources of information, which I try to have throughout my district in all the communities. He told me that there were two men at the old Porter homestead; that they were trapping, hunting and making jackass brandy. He said that one of them was a lumberjack from Westwood and that the other one was Jack Porter; that neither of them were any good and were of a bad character. He said that Porter had come back there to winter several times and that he al-

ways killed deer out of season and that he believed that these two men were the men that were selling the meat in Susanville, as trapping had been poor and they were short of money and grub. Ranger Torgny and I proceeded to Susanville for a search warrant. I thought it best to have plenty of assistance, so laid my information before the sheriff. He at once decided to send two of his deputies with me to assist in making the search, which we did.

On searching the Porter homestead we found at the end of a well used trail about 50 feet from the house a box, just about the right size to carry in a car, packed over half full of deer meat all cut up, which was parts of two deer. We had to leave one of the men there, as there were the two deputy sheriffs, Ranger Torgny, myself, prisoner, and the box of deer meat, which weighed quite a lot. We also had bad roads to go over. Porter had his car torn down with the rear end out and some of the gears broken. I thought that it would give him a chance to get the things together so they would not become lost, as it did not look like he would leave the country without his car. He promised to come in on Monday, but instead beat it to Nevada the next day, and I have heard nothing of him since. Fred Abbott plead guilty on Monday, and just after he plead guilty and before the judge sentenced him I asked him if he knew Ray Taylor of Susanville, if he was in Susanville on or about the 12th of January, and he said he knew Taylor and that he was in Susanville on the 12th.

I then gave my evidence to the court showing that Fred Abbott and J. W. Porter must have had something to do with the selling of deer meat in Susanville. Nevertheless, the judge only levied a fine of \$50 or 50 days in Lassen County jail, and Abbott is serving his time, as we knew he would have to. Of course this is some time to stay in jail for having deer meat in your possession.—C. O. Fisher, Susanville, California.

ALASKA HAS GAME COMMISSION.

Alaska now has a game commission to carry on conservation so that the fur and game resources will not only be maintained but increased. This is a result of the last session of the sixty-eighth congress when a bill was submitted that had been planned by sportsmen and conservationists of Alaska and the United States. The commission consists of five members, one a representative of the Biological Survey, who is the executive officer and fiscal agent, the other four from the four

judicial divisions of the territory. These men have shown a keen interest in their responsibilities, and there is a very bright outlook for the future of Alaskan wild life.

REAL RESULTS IN BIRD BANDING.

As evidence of the worthwhile interest in bird banding, a résumé of operations for 1925 by one such bander in Berkeley is of interest. During the season 573 birds were successfully banded, representing 22 different species. There were 644 repeats and 38 birds returned that had been banded in previous years. With such concentrated work in a particular area our knowledge relative to the migrations and habits of birds should be greatly increased during the next few years.

EFFECT OF OIL POLLUTION ON MARINE AND WILD LIFE.

The Department of Commerce, Bureau of Fisheries, Washington, D. C., last year published a bulletin on the "Effect of Oil Pollution on Marine and Wild Life." (Bur. of Fisheries Document, 995, pp. 171-181.) The conclusion reads as follows:

Marine life and aquatic birds along the Atlantic and Gulf coasts have suffered seriously from pollution of waters by petroleum oil, but other industrial wastes are undoubtedly responsible for much of the damage done. This is a serious problem, primarily because of the vital importance of aquatic life as a source of food. Oil pollution is detrimental to shellfish by destroying the larval forms and rendering the adult mollusks and finny fish unfit for food. It causes considerable destruction of fowl, rendering the birds helpless through its mechanical action on the feathers.

SONOMA COUNTY SCHOOLS HOLD BIRD STUDY CONTEST.

Last fall the county superintendent of schools of Sonoma County planned a bird study contest with the purpose of awakening interest and kindly feeling toward birds. The teachers of the elementary schools were brought together every two weeks for study, and mimeographed helps were furnished every teacher. A list of some fifty common birds were chosen as subjects of study. The contest closed on January 16 when a lecturer from the Fish and Game Commission gave a lecture. Contestants wrote down the name of each bird as it was shown on the screen. A prerequisite for taking the test was demanded in the form of a bird calendar giving the name of the bird, the date, where seen and habits. All the children who were able to correctly identify, from the pictures thrown on the

screen, 25 different kinds of birds, were given a ribbon as a reward.

This scheme was so successful in stirring up interest in birds and conservation that this move of Sonoma County will doubtless be followed by many other counties in the state. The best basis for a future conservation program is to be found in well laid educational plans in the schools of the state at the present time.

PROTECTIVE ASSOCIATION FORMULATES PRINCIPLES.

The following excellent principles were recently adopted by the San Joaquin Fish and Game Protective Association:

With this object in view we hereby pledge ourselves not only to obey the laws of the state pertaining to the protection of fish, game, song birds and forests, but to use our influence to have others obey them.

We agree to report to the executive committee of this association the name of any individual who may to our knowledge violate these laws, or any of them, and if need be to testify against such person to secure his conviction.

LUMBERING TOWN HAS MANY HUNTERS.

The lumbering town of Westwood in western Lassen County contains a large group of sportsmen. It is estimated that at least 1200 men hunted deer last sea-



FIG. 20. Visitors to Sequoia National Park get worthwhile entertainment by watching the bears come in to feed at the bear pits. That they may even be seen in broad daylight is evidenced by the photograph. Photograph by R. A. Abbott.

This association is formed for the protection and conservation of fish, game, song birds and forests, to create a better understanding of the rights of the farmer and more appreciation of the privileges granted the sportsman by the farmer; to encourage the propagation of fish and game and the restocking of the game fields and public waters; to cooperate with the state, county and municipal authorities in strictly enforcing the laws for the protection of fish, game, song birds and forests, and to assist generally in creating a better understanding and appreciation of the value of wild life to the people and the necessity of its proper protection in order to insure a future supply.

son, and during the past year the stores of that city sold 90,000 shotgun shells. Splendid work is being accomplished by the Westwood Rod and Gun Club.

LOWER KLAMATH LAKE STILL A PROBLEM.

That the restoration of the Lower Klamath Lake reservation is a complicated matter is evidenced by the fact that there are really four parties interested, all with certain rights. The owners of the land hold a contract with the Bureau of Reclamation which gives them certain rights including water rights. In fact,

they are to use the water which formerly went into the Lower Klamath Lake on their lands, and what's left over is likely to be pumped or drained into the lake bed and thus part of the lake used as a sump. When the water rights are considered any problem becomes involved. Furthermore, land owners have planted certain areas of the reclaimed land with crops and are making an earnest endeavor to make their projects profitable. To this date they are encouraged rather than discouraged and have paid all of their assessments regularly to the government.

The California-Oregon Power Company owns certain water rights on the Klamath River and will naturally refuse to turn a large quantity of water back into the lake unless allowed to draw it off again during low water on the river. This means that were the rest of the lake bed utilized as a storage reservoir, there would be constant change in water level, and this would endanger breeding water fowl.

Unfortunately, sportsmen and conservationists apparently count least in the matter for the rights and are rather intangible as against those of the land owners and the water right owners, even though it may seem that a better use could be made of the area.

With matters so involved it appears that we should first learn the great lesson that the time to act in such matters is when drainage is first proposed and not after a project is completed. If there is anything to be gained beyond this important lesson, it will have to be gained through long years of struggle, for at present, land owners will inflate the real value of their land and will sell only under compulsion. There is, however, a chance that the prophecy of soil experts will come true and that agriculturists will be unable to successfully farm the land, under which circumstances they would fail to pay their assessments to the government and ask for a cancellation of their contracts, or at least sell out to those interested in the refuge at a reduced price.

There is no doubt, if we had had the present day sentiment when this drainage project was first proposed, there would still be a Klamath Lake Bird Reservation. The trouble was that few people rallied to the cause at the time, which now appears was the most important time to save the refuge. However, Senator Johnson has shown his interest in the matter, and the Associated Sportsmen's Clubs are working earnestly and prophesy final victory.

The latest information relative to the

reflooding of Lower Klamath Lake is as follows:

1. Senator Johnson has shown his interest in the matter and reports that through contracts made by the Reclamation Service the matter is so involved that it seems unlikely of early accomplishment.

2. The time limit for reflooding is not the year 1927, but some ten years or more hence.

3. There seems to be a tendency on the part of government bureaus to "pass the buck."

4. The Associated Sportsmen's Clubs are working earnestly on the matter and prophesy final victory.

MIGRATORY INSECTIVOROUS BIRDS ARE THE FARMERS' FRIENDS.

In the office of the State Department of Agriculture is a collection of dead killdeer which was brought in by the United States game warden, George Tonkin, for analysis of the stomach contents to determine the kind of insects eaten by the birds. Upon examination it was found that the stomachs were filled with grubs and insects injurious to growing crops.

The killdeer is known to be one of the most useful birds on the farm. In this he ranks first among all of his species. The dead birds are a part of a number of killdeer that were shot by Mike Ligitos, a renter, on the property of H. E. Franks on the Garden Highway about eighteen miles north of Sacramento.

Warden Tonkin found Ligitos shooting into bands of killdeer, destroying them by the dozens. Upon questioning, he protested that he was "protecting his crops," not realizing that the killdeer were his best friends and were at that time actually engaged in removing from his fields destructive insects and worms. Evidently he had drawn a hasty conclusion when he saw the birds among his green peas, which were just appearing above the ground.

The grubs and other insects had done serious injury to the young plants. In fact, there were so many insects in the field that a large flock of killdeer had been attracted to the feeding ground. The birds were easier to see and to shoot than the insects to destroy, and Ligitos drew the wrong conclusions. As a matter of fact, if the killdeer had not come on to the field it is quite possible that the farmer would have had no crop.

In this connection, the department wishes to point out that a great many birds, among which the killdeer, robins, meadow larks, flickers, and many other varieties of birds, are the farmers' best friends. The number of insects annually

destroyed by the bands of robins which come each spring saves the farmer thousands of dollars in control measures.

According to Warden Tonkin, the federal laws specifically protect these birds against destruction, and farmers apprehended shooting without a permit are liable to arrest and prosecution.

BEAVERS RAPIDLY EXTERMINATED IN OREGON.

In Oregon beavers are being so rapidly exterminated that it may become neces-

The value of the skins, at the average of \$7.50 per skin, amounts to \$110,257.50. A report by counties indicates practical extermination the first year in several counties. The Baker County catch dropped from 738 to 140 the second year, and practically all counties halved the catch the second year.

TO A BOY WITH A GUN.

MY DEAR BILLY:

When you arrive in Florida this winter, you will find a little 20-gauge shot-



FIG. 21. A 27½ inch Walker Lake trout caught by Frank E. Briggs. It weighed 13½ pounds. The one in the left hand was less than an inch shorter but weighed 15 pounds. Photograph by J. Saunders.

sary to place a ban on the trapping of these animals. A decrease of two-thirds which can be readily seen by noting the difference in the number trapped during two successive seasons, is apparent there. The season of November 1, 1923, to February 29, 1924, yielded 11,111 beaver, while in marked contrast the season of November 1, 1924, to February 21, 1925, resulted in only 3690 being taken.

gun, which is a gift from me. While my hair is almost white and it has been a long time since I was a boy and got my first shotgun, yet I think I know just about how you are going to feel. I know that so well, Billy, that you won't have to write a letter to tell me, and I know you couldn't tell it in a letter anyway, so you just take it for granted that I know all about it. After you have been out

hunting or practicing and learn something about hunting and shooting, just sit down some evening and write me a letter.

There are a lot of things I would like to tell you about the use and handling of a shotgun, Billy, that you must know, and I want you to learn them and practice them quickly to justify my belief that you have reached the period in your life when it is proper for you to have a gun. I am always going to feel more or less responsible for what you do with your gun so I am going to ask you to remember a few very important matters. A gun will kill or injure game when pointed right—thus, it might kill or injure persons or live stock, if pointed wrong. The first matter of importance, then, is how to handle a gun with safety to yourself and your companions, or other persons about as well as with safety to property and animals. Never until you have reached a highly developed skill in hunting, carry your gun cocked or with the safety off; this is something I do not do even now, except when in the known presence of game. Always open the gun in getting over a fence or crossing a hazardous place when a fall is possible, and if a fall is likely, break the gun and take out the loads and close it.

Of course, never point the gun loaded or unloaded at any living thing you do not intend to fire at. This means at a person or at dogs or animals. When in the presence of company learn to so handle your gun whether loaded or not that it never points toward a person. Keep it pointed high overhead or low toward the ground. Watch this particularly in turning around among a group of persons and also learn to watch the direction your gun points when carried over the shoulder. When so carried be sure that the muzzle points high overhead and in turning do not let the muzzle sweep around so as to at any time come in line with any person or house or auto or things of that kind. Close attention to these things as you start out, and practice of little tricks of caution and care, soon becomes second nature; indifference to them results in carelessness and accidents, often with fatal results.

It is a real pleasure to feel that you are trusted and to have careful people want to go hunting on any expedition with you, or to be welcome into any party of sportsmen, and the surest way to have this happen is to observe these and other simple rules of caution, at all times and under all circumstances.

If people see that you do not load your gun until you are in the field and unload as soon as you approach a house

or place where you are to rest, and in loading and unloading handle it so that it does not point at or toward anyone or an animal, they know at once that you have your mind on what you are doing and that you realize you are handling a dangerous weapon and that you know how. Never leave your gun loaded in the house, car or boat. Never put your gun away dirty; this is a very important "don't," so long as you are in Florida. Always keep it thoroughly covered with oil, or vaseline; have a heavy woolen rag saturated with oil handy, and when your gun is handled remember there is usually some moisture on a person's hands and it causes rust and the metal should be wiped off at once.

Maybe some of these things I have written seem unusual, but I mean them as the usual rule. If hunting ducks from a boat, of course you must have your gun loaded, but not while moving about. A friend of mine, a noted trap shot and representative of an arms and ammunition company, nearly lost his life at Sandusky nearly four years ago. Mr. Blank, at one time champion trap shot of the United States, was hunting ducks at Sandusky, Ohio, with Mr. Blank, one of the best amateur trap shooters in Ohio, and as they returned after the evening shooting, and he was out of the boat and drawing it up on the bank, some flag sticks caught the muzzle of his gun, as it lay across a boat seat, causing it to fall off the seat. It struck something in the boat and was discharged, and the load tore away the inside of his upper left arm and almost tore out his heart. I don't suppose there were ever two men more skilled and experienced hunters than these two men, but with all their care this accident happened. Mr. Blank recovered, but will be crippled all his life.

Now, Billy, get it straight—the real pleasure you will only get when you learn to use a gun right—when you know you are safe and your Dad knows you are safe when you are out with your gun. You won't be safe and he will know you are not safe unless you prove it by practicing these and other rules in the use of firearms and good sportsmanship. Another thing, it is not my wish to make a professional hunter out of you, but there is so much good to be secured, not only to your body, but to your mind as well, in going afield with a gun. This little weapon is not a toy, and yet you must not expect it to do all the killing. Use your brain and your Boy Scout experience and hunt wisely, and the pleasure is not all in what you bring to bag. Am hoping that you go up to the new location

and have a chance to shoot some quail, ducks and rabbits. You can slip down along the shore and get rabbits most any evening. Write me about it. With love,

YOUR UNCLE KENT.

—*Outdoor Life*, November, 1925.

SIX RULES FOR SPORTSMEN.

1. Be a real sportsman. There is more honor in giving the game a square deal than in getting the limit.

2. Make sure it's a buck. If you can't see its horns—she hasn't any.

3. Help to enforce the game law. Game and fish are public property—only a game hog will take more than his fair and legal share. Violations should be reported to the nearest deputy warden, forest ranger, or game protective association.

4. Respect the ranchman's property. He regards as an outlaw the man who leaves his gates open, cuts his fences, disturbs his live stock, or shoots near dwelling. Put yourself in his place.

5. Be careful with your camp fire and matches. One tree will make a million matches; one match can burn a million trees.

6. Leave a clean camp and a clean record. Unburied garbage, crippled game, and broken laws are poor monuments for a sportsman to leave behind him.—*An Ideal Vacation Land*. U. S. Dept. of Agriculture, 1923.

THE HOMING INSTINCT IN RED SALMON.

The United States Bureau of Fisheries has been conducting some important tagging experiments with red salmon on the Alaskan peninsula. A recent report* brings out the following interesting facts:

Red salmon that were schooling in the vicinity of the Shumagin Islands and in Morzhovoi and Ikatan bays preparatory to their spawning migration found their way when tagged to a large number of different rivers, some of which were located along the southern shore of the Alaskan peninsula, others along its shores in Bering Sea.

Conclusive evidence that salmon return to their native streams was secured by an examination of scales taken from the fish when it was tagged. Certain distinguishing characteristics of the salmon inhabiting the various streams have been demonstrated, and studies showed that

the fish were returning to the streams in which they were spawned. Data afforded by the scales was associated with methods of growth, ages at maturity, amount of growth and length of sojourn in fresh water, and other minor characteristics of development which can record themselves on the growing scale.

Two streams in close proximity at their mouths often differ widely in the proportion in which different year classes occur. A considerable percentage of Nushagak fingerlings always descend to the sea when but one year old and they mature and return to spawn at the age of four or five years. On the other hand the Kvichak fingerlings are practically all two or three years old when they enter salt water and they mature mostly at the age of six or seven years. These same differences were indicated in scale studies.

Red salmon captured in any trap in the Shumagin Islands, in Morzhovoi Bay, or in Ikatan Bay on any day during the fishing season contained an assemblage of individuals that had originated in diverse streams, some of which were far distant from the point of capture and others nearer at hand, and that when liberated these salmon proceeded each to the stream of its origin. The theory widely entertained by those engaged in the commercial fisheries—that the salmon constituting the runs to Bristol Bay form an undifferentiated lot and pass into one or the other stream in accordance with the direction of the wind or other external circumstance—is thus seen to be wholly without foundation. There is nothing difficult or abstruse in this problem. The facts speak for themselves to anyone who will take the trouble to examining the evidence. It can not be too soon realized by those interested in the continuance of our salmon industry that each stream is an independent unit, that its salmon runs are maintained if sufficient numbers are reserved for seed and are destroyed if this is not done. The Ugashik, the Egegik, the Nushagak, the Naknek and the Kvichak—each depends for its maintenance as an important salmon stream on the fish that are permitted to spawn within its own watershed.

HUNTING LICENSES SWELL STATE REVENUES.

More than 5,000,000 hunting and fishing licenses were taken out during the season 1924-25 by sportsmen and anglers throughout the United States, including Alaska, and the returns to state treasuries amounted to more than \$6,400,000. Detailed figures for the season, just com-

*Gilbert, Chas. H., and Rich, Willis H., 1925. Second experiment tagging salmon in the Alaskan peninsula fisheries reservation, summer of 1924. *Bulletin Bureau of Fisheries*, 42, pp. 1-75, illus.

piled by the Biological Survey of the United States Department of Agriculture, show increases in the numbers of licenses issued and fees received over the two years preceding. Two years before the licenses numbered 4,341,498 and the fees paid were \$5,385,489. One year later 4,395,038 hunters paid for their licenses a total

of \$5,594,982. During the season 1924-25 the license figures were 5,039,834 and the fees totaled \$6,423,276.87. Pennsylvania, with 504,130 licenses and fees of \$613,939.30, headed the list both in licenses and returns to the state treasury. The complete figures are given in the following table:

Hunters' Licenses Issued by States for Season 1924-25.

State	Resident	Nonresident	Alien	Angling	Money returns
Alabama	45,256	138	---	83	\$67,136 61
Arizona	26,485	170	---	---	36,479 00
Arkansas	3,926	303	---	---	8,561 90
California	224,601	930	890	---	245,591 00
Colorado	96,844	382	---	6,632	218,294 50
Connecticut	32,399	380	---	---	36,199 00
Delaware	1,502	250	---	---	4,002 00
Florida	(a)	---	---	---	---
Georgia	29,030	151	---	---	40,598 75
Idaho	60,780*	542	1	6,232	136,336 80
Illinois	265,064	1,478	---	---	213,578 00
Indiana	163,607	258	---	12,452	180,363 20
Iowa	144,729*	273	---	---	147,459 00
Kansas	109,720	110	---	---	100,226 00
Kentucky	80,774	391	---	---	71,160 03
Louisiana	110,778	337	---	---	124,565 25
Maine	33,863*	3,625	71	422	49,212 95
Maryland	60,516	1,791	---	---	109,524 37
Massachusetts	75,484	802	217	---	122,936 25
Michigan	282,328	2,015	---	---	282,016 26
Minnesota	162,824	698	---	---	217,787 75
Mississippi	(b)	---	---	---	---
Missouri	174,699	1,208	---	---	191,922 87
Montana	64,584	154	10	2,958	144,510 50
Nebraska	140,922*	483*	---	2,496	161,129 00
Nevada	3,350	15	---	---	5,175 00
New Hampshire	58,100*	2,550*	---	20,600	130,254 54
New Jersey	138,948*	1,491*	---	5,552	240,584 00
New Mexico	15,260	535	---	8,524	43,426 75
New York	317,384	3,152	---	10,725	345,969 75
North Carolina	(b)	---	---	---	---
North Dakota	34,784	277	---	---	55,539 40
Ohio	362,730	66	---	---	454,402 50
Oklahoma	101,135*	322	---	535	108,398 75
Oregon	53,484	638	---	---	199,490 00
Pennsylvania	501,572	2,558	---	---	613,939 30
Rhode Island	11,179	174	74	---	14,029 00
South Carolina	80,442	899	---	---	120,393 00
South Dakota	63,295	2,205	---	4,318	139,672 00
Tennessee	50,806	425	---	---	75,201 94
Texas	71,842	449	---	---	138,295 70
Utah	53,840*	1,066*	---	214	97,481 00
Vermont	38,050*	939*	---	28,816	70,434 10
Virginia	85,888	1,876	4	712	140,789 40
Washington	182,969*	297*	207	3,083	186,561 00
West Virginia (c)	44,850	106	---	---	46,440 00
Wisconsin	180,000	592	---	---	206,600 00
Wyoming	22,266*	3,755	35	19,740	73,644 75
Alaska	(d)	60	26	---	6,964 00
	4,862,889	41,316	1,535	134,094	\$6,423,276 87

*Combined hunting and fishing license.

(a) Department of Game and Fresh Water Fish created 1925.

(b) No state commission.

(c) For six-month period only.

(d) No resident hunting license required.

USE BLACK POWDER TO FRIGHTEN BIRDS.

The use of black powder as a means of frightening birds out of vegetable fields and orchards is advocated by George Tonkin, federal game inspector, and the California Department of Agriculture.

"It is against the law to kill many varieties of migratory birds," said Mr. Tonkin; "furthermore, killing often has the contrary effect, as dead ducks or dead geese are frequently observed acting as decoys. Birds are more affected by fright caused by unusual conditions than by the death of some of their own number."

Black powder not only explodes with a loud noise but gives forth a great quantity of smoke which will quickly frighten a flock of birds and drive them off the premises. Black powder shells can be secured in bulk from most of the wholesale powder companies, and will be found a very effective remedy against birds preying upon vegetable fields, says the Department of Agriculture.

Furthermore, the black powder is much less expensive in first cost than the smokeless or sporting powders.

From the standpoint of food value, insect pest destroyers and scavengers, our wild birds are increasing in value to the state as well as to the entire nation. This is probably a greater asset to the farmer than to any other class of citizens. The study of bird stomach contents is continually bringing a greater realization of this value.

MARKET GROWING FOR GAME PROPAGATED IN CAPTIVITY.

The importance of the industry of raising game birds in captivity must be judged from the standpoint of both production and consumption of the products, as is the case with the poultry industry in general. According to the United States Department of Agriculture there are more individuals directly interested in keeping and breeding fowls than in the production of any other class of animals or any class of plants. The birds produced in this way include not only chickens, turkeys, and guinea fowl; but also pheasants, peafowl, ostriches, and migratory waterfowl—ducks, geese, and swans—and these are raised in all parts of the United States and under a great variety of conditions. To a discussion in the latest Yearbook of the Department of Agriculture on the economic importance of the poultry industry in the United States, W. L. McAtee of the Biological Survey has contributed the following

chapter on "The Game Poultry Industry":

In the United States the game-bird market has undergone a complete change within a generation. Formerly this market was as well supplied both in quantity and variety as any in the world, the game consisting entirely of wild birds. Now, after almost complete elimination for a period of years through legal restrictions, the game-bird market, although enormously decreased, is gradually growing. The birds marketed, however, except for certain imported species, are for the most part propagated in captivity.

Between 1870 and 1880 the passenger pigeon was shipped literally by the carload, and a single consignment of prairie chickens to a New York dealer weighed 20 tons. Wild ducks by the tens of thousands were poured into the game markets from all the important hunting grounds of the country. It gradually became evident that an increasing demand, easily catered to because of improved facilities for shipping and marketing, was rapidly depleting the wild stock. Conservation laws multiplied, sale was prohibited, and through a final enactment, the federal migratory-bird treaty act of 1918, the market for wild game birds in the United States was practically closed.

This law, as well as those of numerous states, has provisions designed to permit and encourage artificial propagation of game birds and their marketing under restrictions intended to prevent drafts on the wild stock, such as our former experience proved to be incompatible with its maintenance. Such legislation has developed unevenly, as is usually the case when the 48 states act independently. No fewer than 28 states have fair to good laws on the subject, and at least 12 others have made a beginning. The problem is a difficult one, and game breeders should realize that there is no disposition to hamper them; rather the almost universal desire is to encourage them so far as can be done without endangering our present standard of protection of wild game.

The propagation and sale of migratory waterfowl (that is, wild ducks, geese, and swans) is legal under regulations issued by the secretary of agriculture, and thousands of persons have obtained permits issued by him to possess, propagate, and sell birds of this class. Recent figures compiled show that in one year 4291 game breeders reared approximately 42,800 birds, of which about 12,200 were sold for propagating purposes (including those used for decoys), 10,100 for food, and 8000 were eaten at home.

The breeding of nonmigratory game birds, such as pheasants and quail, is under state regulation, but statistics as to the extent of the industry are very unsatisfactory. State game departments in a number of instances rear and distribute many pheasants, but this activity can not be reckoned in estimating the commercial

importance of the propagation of these birds. Definite totals can hardly be attempted with present knowledge of the subject, but the statement may be ventured that the 13,100 pheasants, exclusive of importations, sold for food in New York and New Jersey in 1922 exceeded the number sold for such use in other states. The number sold for propagating and stocking purposes doubtless is far larger, but definite figures have not been obtainable. So far as individual propagators are concerned, the data available would indicate that, while fewer are engaged in the culture of upland than of aquatic game birds, the numbers of these birds sold for propagation and for food are somewhat larger.

Under present conditions the market for artificially propagated game birds is mainly with those desiring to engage in rearing the birds and with sportsmen who wish to use them for decoys and for restocking shooting coverts. Prices realized from these sources are so high that only a limited demand exists for the birds for table use, mainly by the most luxurious hotels and clubs. So long as the demand for decoy, stocking, and propagating birds absorbs most of the output at fancy prices, it is not likely that production of birds for food will become much more important than it is at present. However, should the rearing of game birds continue to increase, prices would decrease and a more general market could be established.

FEDERAL BAG LIMITS REDUCED.

The federal daily bag limits on a number of migratory game birds have been reduced under an amendment to the migratory-bird treaty act regulations adopted by the secretary of agriculture and approved by the president on March 8. Hunters who formerly enjoyed a limit of not to exceed 25 Wilson snipe or jack-snipe a day may take only 20 under the

new regulations when the fall shooting season arrives. The limit on sora has been reduced from 50 birds a day to 25. On rails and gallinules, except sora, a bag limit is prescribed of 25 in the aggregate of all kinds, but not more than 15 of any one species. A daily bag limit of 25 is fixed for coots. The season on black-billed and golden plovers is closed indefinitely. These reductions and close seasons apply throughout the country, regardless of any state law which may allow greater privileges.

In addition to the above, changes were made in the open season for hunting waterfowl in Illinois, Indiana, Kentucky, New Mexico, eastern Washington, and the counties of Nantucket and Dukes in Massachusetts. In Illinois, Indiana, and Kentucky the open season was changed from September 16 to December 31 to the period October 1 to January 15; in New Mexico from October 1 to January 15, to the period October 16 to January 31; in eastern Washington from September 16 to December 31, to the period October 1 to January 15, and in the counties of Nantucket and Dukes in Massachusetts from September 15 to December 31 (which will continue as the open season for the remainder of the state of Massachusetts) to the period October 1 to January 15. These seasons apply to waterfowl (including ducks, geese, and brant) and to coots, gallinules, and Wilson snipe or jacksnipe, but the close season continues on wood ducks, elder ducks, and swans.

All the amendments were recommended by the Bureau of Biological Survey of the Department of Agriculture and concurred in by the advisory board, migratory-bird treaty act, before being adopted by the secretary of agriculture.



FACTS OF CURRENT INTEREST.

Lassen and Modoc County sportsmen are advocating shortening the season on sage hens to five days.



The Associated Sportsmen's Club of California has succeeded in welding the various protective associations into a strong organization which should greatly aid in carrying out California's conservation program.



During the 1925 tuna canning season 34,238,813 pounds of fish arrived at the canneries in Los Angeles harbor, and more than 6,000,000 additional pounds went to other canneries of Los Angeles County.



Final arrangements are being made for the building of a hatchery in Yosemite National Park. At a recent meeting an agreement between the National Park Service and the California Fish and Game Commission was signed and plans are being matured.



Demands for the use of the commission's educational films are continually growing. In several instances farm advisers have used films for several weeks at a time in connection with farm bureau meetings. These educational films are carrying a conservation message to an increasing number of persons annually.



The commissioners have been active in giving talks at fish and game protective association meetings. They are so whole-heartedly in the work that they give freely of their time to meetings of this kind.



During the latter part of April several dozen pheasant eggs were being gathered daily from the breeding pens at the Yountville Game Farm. During May hatching will begin and the rearing pens will soon be in use.



Construction will begin during May of a new hatchery building to replace one impossible of restoration on the Mount Shasta Hatchery grounds. This is the major project in connection with the extensive program of repair and restoration of hatchery equipment now under way.



Complaints relative to pollution have been so many and the need of investigation so great that the Bureau of Pollution has employed a chemical expert who will be in direct charge of pollution cases. Already numerous complaints have been investigated and many tests made.

WATCH FOR MARKED SALMON.

NOTIFY AUTHORITIES IF YOU CATCH FISH WITH PARTS OF FINS MISSING.

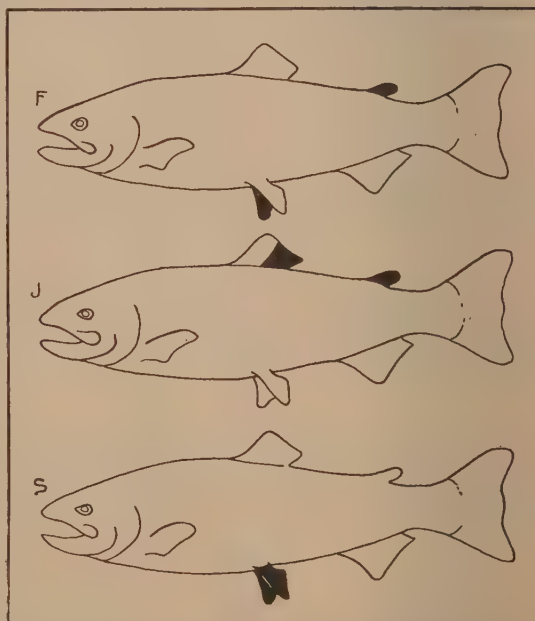
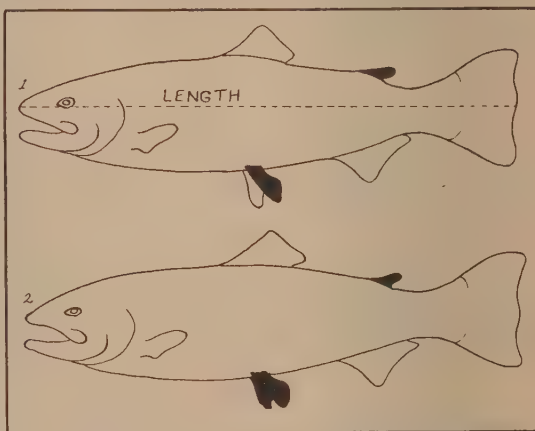
During the season of 1926 marked salmon will be caught in the Sacramento and Klamath rivers and along the coast. Some of these will have either the adipose and left ventral fins removed as in figure 1, or the adipose and both ventrals cut away as in figure 2.

The first of these groups was marked at Fall Creek and liberated in Klamath River in the fall of 1922. The second was marked at Sisson at the same time and liberated in the Sacramento River.

Others were marked by cutting away the adipose and right ventral fins as in figure F, the adipose and posterior half of the dorsal fins as in figure J, or both ventral fins as in figure S. These fish were marked at Fall Creek in 1923 and liberated in the Klamath River as described in CALIFORNIA FISH AND GAME, Vol. 10, No. 1, page 9.

It is requested that anyone who secures one of these fish measure its length from the tip of the snout to the middle of the caudal fin, determine the sex, cut each mutilated fin from the body, scrape a hundred or so scales from the side of the body, write down the length, sex, date and place of capture, his own name and address, and mail all this to the State Fish and Game Commission, San Francisco. The fins should be well salted. The scales may be spread out between two pieces of paper. The commission will pay 50 cents for such data relating to each fish if it proves to actually be a marked individual, and so determined by a scientific assistant of the commission.

The marking of these fish is a feature of a program of scientific investigation on the part of the Fish and Game Commission relating to the habits and life history of species of economic importance. The results of such investigations contribute toward conservation and maintenance of the fisheries, and it is hoped that fishermen, dealers, packers and consumers will cooperate when opportunity offers.



COMMISSION ACTIVITIES.

At the last civil service examination for deputy fish and game commissioner, on March 5, approximately 150 candidates took the examination. This number included temporary employees.



During the months of February and March, 107 arrests were made and fines totaling \$5,685 were imposed. Numerous seizures of illegal fish and game were made, including 168 pounds of striped bass. The heaviest fines imposed were those of \$250 each on two fishermen for using illegal nets in the Sonoma River.



Forty-four dollar-a-year deputies have been appointed and more are to be appointed in the immediate future.



The numerous news items issued by the Bureau of Publicity are being used by more than two hundred newspapers. Adequate newspaper publicity is now being attained.



A mimeographed "Service Bulletin" now goes to all employees at monthly intervals. It contains information relative to more efficient and unified handling of conservation work.



Patrol districts under competent captains have been created as follows:

Mount Shasta—Wm. M. Lippincott.....	Yreka
(Counties of Siskiyou, Shasta, Modoc and north-east Trinity)	
Sacramento Duck—S. J. Carpenter.....	Maxwell
(Counties of Tehama, Glenn, Colusa, Butte, Sutter and the southwest corner of Yuba)	
Sacramento—D. E. Roberts.....	Murphys
(Counties of Sacramento, Yolo, El Dorado, Amador, Calaveras, San Joaquin and eastern Solano)	
San Joaquin—J. E. Newsome.....	Newman
(Counties of Madera, Mariposa, Merced, Stanislaus and Tuolumne)	
Fresno—E. W. Smalley.....	Stanford
(Counties of Fresno, Kings, Tulare and Kern)	
San Francisco—M. S. Clark.....	San Francisco
(Counties of San Francisco, Alameda, Contra Costa, San Mateo and Bay patrol)	
Los Angeles—C. S. Bauder.....	Los Angeles
(All the counties of southern California)	



There has been prepared by the Department of Fishculture a list of all screens and ladders which have been ordered installed by that department over a long period of years, and a further list of those streams where such installations are necessary and where orders

have not been made. Also a letter has been forwarded by the chief patrol officer to every deputy, instructing him to make a personal survey of his district and report the present condition of all screens and ladders and all places where new installations are necessary. These reports are now coming to hand and within the next few weeks the commission will be in a position to enforce the screen and ladder law in a way never heretofore attempted. Many individual instances of inadequate screens and ladders have already been investigated by the commission.



Owing to the depth of snow on the high Sierra passes, difficulty will be experienced this year in reaching the Rae Lakes Egg Collecting Station sufficiently early to secure a good take of eggs.



Mr. George Coleman, biologist, is making a biological survey of conditions of Lake Tahoe and tributary streams. The work will be continued throughout the summer.



The old Kaweah temporary hatchery located at Power House No. 1 is being moved to a new site three miles farther up the river, where the water will be tested this summer as to its suitability for fish-cultural purposes. If the water proves satisfactory, arrangements will be made to construct a permanent hatchery on this site.



Although the total catch of sardines has been less than that for last season, yet the pack will show an increase of 25 per cent, amounting to something over two million cases.



A fish bulletin detailing the results of the sardine investigation carried on by the State Fisheries Laboratory is now ready for press. The bulletin represents only part of five years of work, but it is expected to form a distinct contribution to the science of fisheries conservation.



A biological investigation of striped bass has been carried on during the winter to determine the age, and rate of growth, also the size and age at which bass mature, and to secure data upon which to determine the proper minimum mesh of nets to be used. Microscopical studies of the scales have greatly aided in the studies.



A very important conference was held at Bakersfield on March 23 at the office of the horticultural commissioner relative to predatory animal control in game refuge 1-M. Sheep herders maintaining that coyotes from the refuge prey upon their sheep, asked permission to use poison to exterminate them. Acting upon the policy adopted by the cabinet in regard to predatory animal control, opposition was made to the use of poison pending completion of a comprehensive

report now being prepared by Mr. Joseph Dixon. In the interim the commission will allow trapping of coyotes under the direction of the Bureau of Biological Survey. The decision was satisfactory to county officials.



During the past winter 3,765,000 salmon eggs were hatched at the Fall Creek Hatchery. Of this number 1,165,000 were liberated in the Klamath River during the month of March. About half of the remainder will be held in the ponds for fall planting.



At the Fort Seward Hatchery there are 1,697,000 young salmon on hand and in fine condition.



Trout spawning operations on the Klamath River progress satisfactorily during the spring. Spawning fish did not appear in very great numbers early in the season, owing to low water.

Up to April 1, 1,182,000 trout eggs had been secured at Bear Lake and were being hatched in the Bear Lake Hatcheries. Eggs were secured from Kidd Creek, Grout Creek, and North Creek.



Mr. R. J. Irvine has been employed by the Bureau of River and Harbor Pollution to conduct investigations relative to pollution and to make chemical tests as to the quantity of pollution. All the known sources of stream or bay pollution in the San Francisco Bay region have been visited within recent weeks and reports made.

Pollution by crude oil has been found to be one of the most serious problems before the pollution bureau. This is caused largely by improper cleansing of wastes from large oil refineries. Still another serious problem is that of tannery and distillery wastes. Two important investigations of these problems are under way at the present time. In several localities reports of pollution, due to discharge of crank case greases and oils by garages through city sewer systems, have been investigated, and recommendations for solution or improvement of the situation made to Major Rolin G. Watkins, director of the pollution bureau.



By the end of March, Superintendent Bade of the Yountville Game Farm was collecting six dozen pheasant eggs daily. During April nearly double that number were being laid. Incubators as well as hens are being used in hatching operations. The breeding stock of ring-necked pheasants numbers 256. Four other varieties of pheasants are to be found in the pens, together with a few Hungarian partridges and valley quail.



During the past few months many calls have come in for employees to address various organizations, notably fish and game protective associations. New policies and problems confronting the commission

have been frankly discussed with the sportsmen of the state. The following report indicates the extent of this activity:

Date	Auspices	Lecturer	Attendance
Mar. 2—	Garfield P. T. A., Berkeley	Bryant	185
Mar. 4—	S. F. Aquarium Society, San Francisco	Scofield	50
Mar. 4—	Sardine Exporters, San Francisco	Greene	20
Mar. 11—	County Supervisors Convention, San Diego	Bryant	235
Mar. 11—	San Joaquin Fish and Game Protective Assn., Stockton	Zellerbach Greene Hunter	350
Mar. 16—	Los Gatos Fish and Game Protective Assn., Los Gatos	Greene Hunter	80
Mar. 18—	University High School, Oakland	Bryant	650
Mar. 18—	Berkeley Evening High School, Berkeley	Bryant	130
Mar. 20—	San Diego Fish and Game Protective Assn., San Diego	Greene Hunter	21
Mar. 23—	Lindsay Fish and Game Protective Assn., Lindsay	Zellerbach Greene Hunter	776
Mar. 24—	Stanislaus-Tuolumne Counties Fish and Game Protective Assn., Modesto	Zellerbach Greene Hunter	400
Mar. 27—	Santa Cruz Rod and Gun Club, Santa Cruz	Zellerbach Scofield Greene	300
Mar. 31—	Gilroy Game Protective Assn., Gilroy	Watkins	50
Mar. 31—	Camp Fire Girls, Berkeley	Bryant	10
			3257



For three years Chas. Latieze, of 115 Bernard street, and Leon Coudere, of 1351 Mason street, San Francisco, played at "hide and seek" with fish and game wardens. In all that time (despite their belief that the men were violators of the fish and game laws), the wardens were unable to "catch them with the goods." Every time they were approached it was found that they had previously gotten rid of their illegally taken catch of fish.

The chase came to an end on the Pescadero road April 25, when Patrol Captain M. S. Clark and Patrolman Jack Burke, of the Fish and Game Commission, overtook the pair, and, searching their car, found 78 trout hidden in the bottom of boxes of lettuce and artichokes they were bringing up from Latieze's ranch. Justice of the Peace Ellis C. Johnson completed the story when he fined Latieze \$200 in his court at Daly City the following morning. Latieze pleaded guilty to the charge against him and accepted responsibility for possession of the fish.

COMMERCIAL FISHERY NOTES.

By N. B. SCOFIELD, Editor.

FISHERY STATISTICS FOR 1925.

Statistics compiled by the Commercial Fisheries Department of the Fish and Game Commission show a large catch of fish for the year 1925. The total of all fish taken in California waters in 1925 (exclusive of mollusks and crustaceans) was 404,002,066 pounds. Mollusks and crustaceans contributed 10,751,246 pounds, bringing the total up to 414,753,312 pounds. To this may be added 12,045,512 pounds taken in Mexican waters and brought to the canneries and markets at San Pedro; and 10,078,075 pounds taken in the same area and landed at San Diego, for a total of 22,382,587 pounds of "immigrant" fin-bearing beauties. The gross total of all fish handled by California market fishermen during the year is thus given as 218,567.7 tons.

Some fish! The figures thus given out show a gain of slightly in excess of 28 per cent over the figures of 1924.

The greatest gain in any one species is that of the skipjack (*Euthynnus bonito*), a fish of the mackerel family and somewhat similar to the tunas. The total figure for this variety in the year 1925 was but 8,768,114 pounds, but this was an increase of 546 per cent over the catch of the previous year. From a position of no importance in 1924 the skipjack rose to that of fourth in all fish taken (other than sardines) in 1925.

The sardine, California's greatest commercial fish, showed a total of 315,294,986 pounds taken in 1925, an increase of 29 per cent over the 1924 catch. This variety comprised 78 per cent of all fish taken in California waters last year. The sardine take was 72,609,028 pounds greater than that of the year 1924.

The albacore and other tunas, classed as California's second most interesting fish crop, increased at the rate of 33 per cent in 1925. Something over 5000 tons of this variety came into San Pedro and San Diego from Mexican waters. The California take was 28,837,702 pounds.

The salmon, for many years one of California's largest fish crops, fell off 5 per cent last year. The total catch for the year was 9,525,753 pounds. The catch in striped bass increased 26 per cent, with a total of 837,773 pounds.

The smallest take in the state commercial fish crop was that of steelhead trout (*Salmo irideus*), of which 222 pounds were taken in California waters. Mexican waters contributed none of this variety.

Among the other varieties showing a decrease in 1925 were: yellowtail, white sea bass, sculpin and white bait. These decreases ran from 10 to 42 per cent.

Shad, which is taken only in the Sacramento River and its tributaries, showed an increase of 80 per cent. The total catch was 2,439,826 pounds.

Flatfish, including halibut, flounder, sole and sand dabs, increased but 2 per cent. Mackerel increased 8 per cent.

Among the crustaceans the 1925 take of crabs increased by 100 per cent. The take of spiny lobster increased 43 per cent. Mollusks showed little or no change. Abalones increased from 2,241,812 pounds in 1924 to 2,352,866 pounds in 1925.

An interesting sidelight on the figures thus made public is that San Pedro leads all other state ports in fish tonnage. The total landed there in 1925 was 218,086,323 pounds. Monterey ranks second with a total of 132,226,106 pounds. Sardine canning operations at both those ports are declared to be the cause of this condition.

The figures can best be appreciated by comparing them with those of such fishing ports as Boston, Gloucester and Seattle, where the fish catch landed during the same period was 149,038,498, 49,471,954, and 32,394,460 pounds, respectively, according to figures of the Federal Bureau of Fisheries.

SALMON TO BE TAGGED ON CALIFORNIA COAST.

In cooperation with British Columbia, the United States Bureau of Fisheries and the states of Oregon and Washington, the Department of Commercial Fisheries is undertaking the tagging of 2000 salmon caught by trolling along the coast of California. Representatives of the Fish and Game Commission will go out with the trolling boats and purchase the fish from the fishermen as they are caught. A numbered metal tag will be securely clamped to the tail of the fish and it will be immediately returned to the water.

The object of this experiment is to determine the migration of the salmon. It is expected to furnish some interesting results, for last year British Columbia did some tagging to the westward of Vancouver Island and two of the fish tagged there put in an appearance in the Sacramento River, California, and over fifty were recovered in the Columbia River. As salmon are known to return

to their parent stream for the purpose of spawning, the capture of the two tagged salmon in the Sacramento River is evidence that our Sacramento salmon wander far afield, which brings about interstate complications and international complications as well.

A reward of 50 cents is being offered for each tag returned to the Fish and Game Commission with information concerning where the fish was taken and the date and method of capture.

NEW MEXICAN TREATY INCLUDES FISHERIES REGULATION.

The following is from an article appearing in the April, 1926, issue of the *Pacific Fisherman*, and is of interest to the commercial fisheries industry in southern California:

"The new treaty recently negotiated between the United States and Mexico, which is expected to become effective in the near future, provides for a more definite policy in the regulation of international fisheries adjacent to the boundary of the two countries, and is expected to bring about more satisfactory conditions in the Lower California fishery whose product goes mainly to United States markets. Provision is made for a commission to consist of two representatives of each government, whose unanimous recommendations will serve as a guide for cooperative legislation. The treaty also takes up narcotics and immigration questions, which have occupied public attention to the exclusion of the fishery features.

Owing to the great interest of California in the border fisheries, N. B. Scofield, chief of the Commercial Fisheries Department of the State Fish and Game Commission, was some time ago called to Washington for consultation on the matter. A question arose as to whether the terms of the treaty might not tend to

transfer a measure of the state's control of its fisheries to the federal government; but under the wording adopted there seems to be little possibility that this would occur. On the other hand, the treaty is expected to be highly advantageous to the southern California fish packing industry, as well as to Mexico, which derives a large revenue from American fishing operations based at Lower California ports.

It is understood that there has in the past been some lack of uniformity in the administration of the fisheries in Lower California; the export tax on fish is nominally \$30 per ton, but it is believed that some operators have been paying only half that amount, and considerable poaching also has been done. The treaty is said to provide that all fishing boats will be required to clear from ports of the country in whose waters they have been operating, which will facilitate the uniform collection of duties and place operators on an equal footing. It is thought possible, also, that the treaty may result in a reduction of the tax. In view of the various advantages, Mr. Scofield feels that the treaty will be of benefit to both countries in so far as it deals with fishery matters."

Advice from Washington states that President Coolidge has approved the names of Henry O'Malley (chief of the United States Bureau of Fisheries) and N. B. Scofield as the two commissioners on the International Fisheries Commission—United States and Mexico—to represent the United States.

PATROL BOAT ALBACORE GETS NEW ENGINE.

The gasoline engine in the patrol launch Albacore, in southern California, which has seen eight years' service, is being replaced by a 65 h.p. full Diesel black oil engine.

LIFE HISTORY NOTES.

MOUNTAIN SHEEP TAKEN CAPTIVE.

Sportsmen of the San Joaquin Valley were much interested last winter when reports were received that a strange animal had been seen near Woody, Kern County. This animal resembled the domestic ram except that it had a body somewhat like a deer and a head like a sheep. It was first reported by a motorist who saw it standing by the side of the road. A day or two later it was seen near Glenville, about eight miles east of Woody. The following day, Mr. Benton Martin, while looking for cattle near his

ranch, saw this animal, and with the aid of his dogs succeeded in roping and taking it home.

This animal, which proved to be a mountain sheep, seemed to be at home in its new surroundings and was allowed to run loose in Mr. Martin's barn and corral, from which it escaped during the night. However, several pictures were taken of this sheep, one of which is reproduced herewith.

Many reports are received that mountain sheep have been seen in the high mountains of Tulare County, but the

only report verified was when Dr. Joseph Grinnell was called as an expert witness in a case involving the killing of a mountain sheep near Milo, in Tulare County. That sheep, a female, and the ram described above are the only ones of actual record for this county in years.

Old hunters state that mountain sheep were formerly plentiful in the Mount Whitney and Kern River country, but none have been seen in recent years.

Mountain sheep are not uncommon in eastern Inyo County, and many wonder if this specimen, caught at least 75 miles as the crow flies from its natural habitat, is one of the Inyo sheep strayed from its home in the desert, or if it had been held

INVESTIGATIONS OF DEER DISEASE IN MENDOCINO COUNTY.

During the past winter numerous reports have come from Mendocino County that deer were dying from some sort of disease and that most of these deer were young. An investigation made by Roy Ludlum of the Fish and Game Commission leads to the view that at least some of the stories were unfounded; in fact that perhaps they were started purposely to keep hunters out of certain territory. One man who reported many deer sick, admitted when questioned that there were only a few specific instances. Most of the newspaper items were evidently based on information furnished the Biological



FIG. 22. Stray Sierra mountain sheep discovered and photographed near Woody, Kern County. It is a very rare instance when a mountain sheep wanders so far below timber line. Photograph by B. Martin.

in captivity and had escaped and was heading for its home when discovered and caught; or if this is one of the survivors of the bands that once roamed the high mountains of Tulare County. The last theory seems the most probable, as this sheep has not been seen since its escape two months ago, showing that it still retained its inherited cunning.

Cattlemen and sportsmen have been requested to report any information in reference to this sheep, and it is hoped that more will be heard later.—O. P. Brownlow, Porterville, California.

Survey by this man. In the Island Mountain region, the particular area covered in the investigation, there was no indication that any great number of deer had died from an epidemic.

A report by Frank Clarke, who made studies of the deer disease in Trinity County several years ago, is to the effect that a considerable number of young deer died in the vicinity of Laytonville, and he explains their death as follows:

"The fawns got a bad start last summer. There was an abundance of native grasses. The quantity was unusually

great, while the quality was lacking. Permit me to cite my own business. The calves and lambs that were born in February and early March got a good start and developed at about an 85 per cent rate, while those that came in April or May (just a few dozen in my case) were almost 'useless' unless put in an alfalfa field during the summer.

Up here we had a great deal of rain during April, May and June. The grasses grew to unusual heights. Nature fulfilled its mission in that case: coarse stalks and seed. But nutriment was lacking proportionately, while fiber and acid predominated. Having exhausted themselves, the plants did not furnish any late green seed. The mass of stuff fell down and in general a great deal of it moulded and rotted.

These conditions prevailed in this section of the country: domesticated stock did not fatten well, and, as I have stated above, the late born did nothing without unusual help. The fawns come here about May. Last season they fared like everything else, maybe worse. The acorn crop here was very light; but autumn came early and winter was mild, otherwise the deer would have fared badly. There was what the ranchers call 'fine feed' all winter. But the young deer didn't seem to thrive. They came out into the grass, ate heartily, got diarrhoea, and many of them died. The rations they got during the first months of their existence were doubtless lacking in vitamins. In this instance I do not believe there was any definite disease, at least nothing which could be controlled. I believe the present trouble is one that occurs nearly every year, sometimes worse than others. The popular opinion among old timers, like my father, is that during winters of abundant rank growth of grass like this past winter, the deer will be affected with 'scours.' This seems to be true especially when there is lots of clover, green and rank. I remember that the winter of 1900 and 1901 was warm and wet. There was abundant feed and the deer got sick and died everywhere. That time the grown deer were affected as well as the young ones. We had a man building a fence at that time. He and his family nearly starved because the deer were too thin to eat. He hunted all over the country and found plenty of deer, sick and dying. He was a careful observer and did not exaggerate.

It is claimed that the fawns are born later in the spring now than they were years ago. This seems reasonable when we consider that 'stocking' the country has literally killed out certain plants that

formerly furnished green feed for deer all year around. The depletion of their normal foods naturally hampered their nutrition and growth. A female under impaired conditions does not usually breed as soon as one under favorable conditions."—H. C. Bryant, Berkeley, California.

REPORTS ON ANTELOPE FAVORABLE.

During the past year numerous antelope have been seen in Secret Valley, Lassen County, and several small herds have been reported regularly in Modoc County near Alturas. One herd said to have numbered but six a few years ago contains twenty-two at the present time.—H. C. Bryant, Berkeley, California.

SISKIYOU COUNTY PAYS A BOUNTY ON COYOTES.

On November 15, 1925, Siskiyou County placed a bounty of \$5 each on coyotes. Between that date and January 31, 1926, trappers have collected bounty on 522 coyotes. A greater portion of these coyotes were caught in the Scott River basin. This part of Siskiyou County is our best deer country, and these coyotes have taken a heavy toll in the past two years. A large number of wild cats have been taken this winter, some extra large ones.—Wm. Lippincott, Yreka, California.

SALMON FAVORED BY UNUSUAL CONDITIONS.

The past season salmon have had a better chance than usual to run the gauntlet of fishermen's nets in Carquinez Straits. The abundant rain brought on freshets which made conditions impossible for the laying of nets. Then during April a strike of fishermen gave a chance for another run of salmon to reach their spawning grounds. Of course this is just in addition to the regular opportunities afforded salmon through a close season, a one day a week, when nets are not allowed in the river. That salmon still grow to be of large size is evidenced by one taken on April 20, 1926, at Sutterville, which weighed 66 pounds.—W. J. Green, Sacramento, California.

STURGEON ON INCREASE.

The sturgeon is the only fish in the State of California given total protection by law; furthermore, this fish is one of the largest fishes found in fresh water. Originally very abundant, its numbers were decimated by Chinese who used set lines. A further factor is to be found in the fact that the eggs are the basis of that delectable dish of the epicure—caviar.

For a number of years past the sturgeon has seldom been seen in streams; however, during the last year complaints by Sacramento River fishermen have been on the increase. This big fish occasionally strikes a salmon net, causing con-

siderable damage. Fishermen near Rio Vista have also reported seeing this large fish occasionally break the water. It is to be hoped that these reports really mean that this fish is again on the increase.—W. J. Green, Sacramento, California.

CONSERVATION IN OTHER STATES.

OREGON HAS NEW BAG LIMIT ON TROUT.

At the request of sportsmen who are vitally interest in maintaining angling in the lakes of the central Oregon district, the bag limit on trout has been reduced by the game commission to thirty fish or fifteen pounds and one fish in one day; and sixty fish or thirty pounds and one fish in any seven consecutive days.

ILLINOIS EXTERMINATING WOOD-CHUCKS.

It has become necessary for the state of Illinois to employ poison as a means of ridding itself of woodchucks. This is against the law, as no wild game or other animals even when found destroying property may be poisoned. However, the Department of Conservation has now authorized the farmers to use cyanide of potassium, but only under the direction of an expert or representative of the department. Many fur-bearing animals inhabit the home of the woodchuck, and it is for this reason that this care must be taken, and only the expert is able to detect the presence of these animals.

OREGON CLOSSES CERTAIN LAKES.

Oregon has determined upon a policy of closing certain depleted lakes and streams to anglers for a period of ten years. It is understood, however, that any of these streams may be reopened when requested by organized sportsmen of the counties in which the streams are located. In this we see an extension of the refuge idea to fish. As a rule a stream and all of its tributaries are closed by an order of the State Game Commission. In Klamath County five streams and four lakes have been closed to the angler, together with a section of the Klamath River and a small area on Link River below a dam. About sixty lakes and streams have been closed in Lane County. Many of the small mountain lakes which formerly contained no fish life, but which were recently stocked, have also been closed for a period of three years. It is evident, therefore, that an extensive program has been mapped out.

MISSOURI INCREASES REFUGE SYSTEM.

Missouri began a game refuge system about two years ago with the purchase of one 12,000-acre tract and another 5000-acre tract. Now comes the announcement of the establishment of a game refuge of 2000 acres of virgin timber land in Mississippi County. A single strand of heavy galvanized wire will surround the sanctuary. Along this wire metal signs will be hung at intervals of 100 yards, "Trespassing at any time for any purpose is unlawful." This 2000-acre enclosure will be the cover for wild animal life and will be left in its natural condition and undisturbed except for an occasional inspection trip of the refuge keeper.

Feed will be furnished birds in the form of grain which will be planted in certain places and left to grow. A public-spirited citizen donated the area to the state of Missouri.

PENNSYLVANIA ISSUES EDUCATIONAL BULLETIN.

The Board of Game Commissioners of Pennsylvania has just issued a bulletin entitled "Year's Program for Bird Protection" by George M. Sutton, chief of educational service. In the introduction it is pointed out that an educational service with a trained ornithologist in charge has been established. The new bulletin is designed primarily for use in the public schools of the state. The friends of bird life, the enemies of birds and methods of protecting and attracting bird life are the main subjects treated. Attractive photographs are used in illustration.

MISSOURI CLOSSES SEASON ON DEER.

Missouri's remnant of deer have been reduced to only 395, due mainly to the great inroads made by dogs. There is to be a closed season on deer for five years, during which period it is hoped to increase the deer population of the state. This can only be done with the additional cooperation of the fox hunters, the owners of the dogs.

ILLINOIS LICENSES HUNTING CLUBS.

At a recent meeting of the Illinois General Assembly many changes were made in the game and fish code. Of particular interest is section 27a on hunting clubs. This new regulation requires any person or club holding land for the purpose of hunting migratory birds to make application to the Department of Conservation and pay a license fee of \$10. An accurate daily register must be kept showing number and kind of migratory birds killed, which shall be open to inspection to persons having authority to enforce the game laws of Illinois. If no record is kept by one hunting on a private reservation he can be held under the

contention that all game in possession was shot in one day.

Persons not hunting on a reservation will not have to keep daily records, but they can not exceed the daily limit of migratory birds.

INDIANA'S EDUCATIONAL WORK.

The conservation commission of Indiana hires a school lecturer whose duty it is to give conservation lectures at the various schools of the state. Part of this lecturer's salary is paid by the Audubon Society. With a fully equipped Ford and lantern, this man is able to reach practically all of the schools of the state. His aim is "to make sportsmen conservationists out of mere killers."



STATEMENT OF INCOME.

October, November and December, 1925.

	Detail	Total
License sales:		
Angling.....	\$55,262 00	
Hunting.....	75,463 00	
Market fishermen's.....	4,860 00	
Trapping.....	2,247 00	
Wholesale fish packers' and shell fish dealers.....	325 00	
Game breeders.....	30 00	
Total license sales.....		\$138,187 00
Other income:		
Court fines.....	\$17,736 00	
Fish packers' tax.....	23,794 82	
Kelp tax.....	1 20	
Fish tag sales.....	829 81	
Game tag sales.....	26 44	
Interest on bank deposits.....	724 06	
Sale of nets and twine.....	150 00	
Total other income.....		\$43,262 33
Total income.....		\$181,449 33

STATEMENT OF EXPENDITURES.

For the Period October 1, 1925, to December 31, 1925, of the Seventy-seventh Fiscal Year.

Function	Materials and Supplies	Salaries and Wages	Service and Expense	Property and Equipment	Total
Administration:					
Commissioners.....			\$27 55		\$27 55
Executive offices.....	\$142 33	\$5,454 99	1,156 19	\$84 72	6,838 23
Printing.....	2,772 05				2,772 05
Research and publicity.....	24 55	1,095 00	204 90		1,324 45
Accident and death claims.....			807 30		807 30
Department totals.....	\$2,938 93	\$6,549 99	\$2,195 94	\$84 72	\$11,769 58
Commercial fish culture and conservation:					
Superintendence.....	\$185 70	\$2,637 10	\$1,261 61		\$4,084 41
Inspection and patrol.....	944 69	8,240 23	1,776 12	\$66 99	11,028 03
Research.....	616 32	2,617 50	805 81	31 55	4,071 18
Statistics.....	10 96	2,023 38	143 84		2,178 18
Propagation and distribution of salmon.....	5,470 29	4,448 33	333 94	71 36	10,323 92
Department totals.....	\$7,227 96	\$19,966 54	\$4,321 32	\$169 90	\$31,685 72
Sporting fish culture:					
Superintendence.....	\$17 47	\$2,575 00	\$578 64	\$3 50	\$3,174 61
Special field investigations.....		129 03	54 17		183 20
Propagation and distribution of trout.....	15,559 21	12,358 69	2,438 10	174 03	30,530 03
Department totals.....	\$15,576 68	\$15,062 72	\$3,070 91	\$177 53	\$33,887 84
Patrol and law enforcement:					
Prosecutions and allowances.....			\$12 98		\$12 98
General patrol.....	\$622 96	\$35,413 89	23,471 57	\$108 75	59,617 17
Fish and game conservation:					
Game bird introduction.....			\$0 50		\$0 50
Game farm.....	\$203 80	\$350 00	152 58	\$929 05	1,635 43
Mountain lion hunting.....		375 00	385 12		760 12
Mountain lion bounties.....			1,180 00		1,180 00
Department totals.....	\$826 76	\$36,138 89	\$25,202 75	\$1,037 80	\$63,206 20
License commissions.....			\$16,565 30		\$16,565 30
Total Fish and Game Commission.....	\$26,570 33	\$77,718 14	\$51,356 22	\$1,469 95	\$157,114 64

FISH CASES.

October-November-December, 1925.

	Number Arrests	Fines Imposed	Jail Sentences (days)
Violations of Angling License Act.....	13	\$290.00	10
Violations of Commercial Fishing License Act.....	1	25.00	---
Trout: over bag limit.....	6	125.00	---
Trout: offering for sale.....	1	100.00	---
Striped bass: over bag limit; undersized	13	245.00	60
Striped bass: sale, closed season.....	2	50.00	---
Crabs: undersized.....	13	200.00	---
Crabs: closed season.....	1	25.00	---
Clams: undersized; over bag limit.....	33	1,325.00	---
Cockles: undersized	2	50.00	---
Abalones: undersized; over bag limit.....	48	1,050.00	---
Lobsters: undersized.....	19	730.00	---
Lobsters: closed season.....	2	125.00	---
Salmon: taking, other than with hook and line.....	14	1,100.00	---
Salmon: over bag limit.....	1	100.00	---
Halibut: undersized	2	40.00	---
Barracuda: undersized	1	100.00	---
Fishing within 250 feet of fishways.....	4	25.00	540
Pollution of streams.....	3	200.00	90
Illegal night fishing.....	3	75.00	---
Nets: illegal possession or use.....	8	600.00	---
Totals.....	190	\$6,580.00	700

GAME CASES.

October-November-December, 1925.

	Number Arrests	Fines Imposed	Jail Sentences (days)
Violations of Hunting License Act.....	68	\$1,115.00	10
Violations of Fur Trapping Regulations.....	4	60.00	---
Deer: hunting, killing, possession; closed season.....	35	2,760.00	150
Deer skins: evidence of sex removed.....	1	50.00	---
Deer: killing, possession; does, fawns, spike bucks.....	10	450.00	---
Ducks: killing, possession; closed season.....	1	50.00	---
Ducks: over bag limit.....	12	440.00	---
Wood ducks: killing, possession.....	1	25.00	---
Shorebirds: killing, possession.....	16	440.00	---
Wild pigeons: killing, possession.....	2	50.00	---
Doves: killing, possession; closed season.....	1	25.00	---
Cranes: sandhill, killing, possession.....	2	50.00	---
Quail: over bag limit.....	1	25.00	---
Quail: killing, possession; closed season.....	28	1,050.00	---
Pheasants: killing, possession.....	2	125.00	30
Nongame birds: killing, possession.....	12	300.00	---
Rabbits: cottontail-brush; killing, possession; closed season.....	10	230.00	---
Squirrels: killing, possession.....	3	95.00	---
Shooting from power boat, automobile.....	18	301.00	2
Night hunting	33	710.00	---
Totals.....	260	\$8,351.00	192

SEIZURES OF FISH AND GAME.

July-August-September.

GAME		FISH	
Quail	2	Trout	246
Doves	71	Striped bass	579
Nongame birds	3	Barracuda, pounds	6500
Deer meat, pounds	1912	Pismo clams	4914
Rabbits	22	Crabs	19
Robins	6	Abalones	201
Plover	1	Salmon, pounds	12,350
Ducks	38	Crab meat, pounds	260
Sagehens	3	Smelt, pounds	10
Tree squirrels	3	Catfish	115
Bear hides	1	Lobsters	36
Bear meat, pounds	10	Nets	2

October-November-December.

Quail	95	Trout	167
Doves	—	Striped bass	276
Pheasant	3	Barracuda, pounds	2863
Nongame birds	9	Pismo clams	1073
Deer meat, pounds	944	Lobster	506
Rabbits	3	Crabs	781
Beaver hides	1	Crab meat, pounds	55½
Robins	2	Abalone	329
Ducks	1449	Salmon, pounds	1188
Tree squirrels	9	Nets	3
Shorebirds	268	Catfish, pounds	86
Seagulls	3	Spear	1
Deer hides	10	Halibut, pounds	1½
Bear hides	1	Cockles	22
Sandhill crane	1		
Mud hens	2		
Geese	139		
Wood ducks	2		
Pigeons	5		



By Fish and Game Commission
Department of Commercial Fisheries

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF OCTOBER, NOVEMBER AND DECEMBER, 1925.

Species of Fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego
Albacore							1,093	51,514	327,225		200,469	1,595	7,310	589,206	247	9,128
Anchovies											3,415			3,415		
Barrauda											127,298			255,339	794,435	110,745
Bluefish							6,039	1,838	13,648	43,205			84,836	15,386		
Bocaccio								46,917	143,433					196,389		
Bonito									4,477	882	99,407	735	34,192	139,693	66,571	7,987
Carp	6,202			724	5,797	2,854								15,377		
Catfish	76,515			65	28,144	14,555								119,279		
Chillipepper							3	48,206	11,741					59,950		
Cuttus Cod	520	13,306					138,231	10,222	98,494					260,773		
Dolphin																
Eels				53			5							5		
Flounders	1,219	35,400				1,403	218,345	7,667	159		159			264,405		
Grayfish							85,046				4,176			118,306		
Greenfish																
Hake							9,580									
Halibut	67						640	297	578							
Hardhead																
Herring	1,503		431		11,344	255				60,349	54,219	3,598	17,708	137,516	4,263	67,917
Kingfish			1,920				50,648			361			9,065	63,407		
Mackerel							3,124	3,913	3,633		122,586			134,517		
Marlin							30		177,675	9,316	501,475	48,296	155,236	892,028	266	7,331
Mullet																
Perch	6,351	840					4,956	6,187	2,637		21,816	1,453	796	726		9,271
Pike					919	622							992	61,820	113	615
Pompano														1,950		
Rock Bass														1,857		
Rockfish	3,469	9,438					220,156	22,973	83,632		12,583	6,091	18,319	36,993		850
Sablefish							54,093	40,729	2,217	5,440	441,246	9,723	424,846	1,229,932	3,378	10,580
Salmon	320,885	15,960	7	2,263	4,241	4,774	37			3	247			97,289		680
Sardabs							539,388	36,175	1,095	160				332,207		
Sardines							37,078	23,914,798	153		37,543,253	123		61,957,099		
Sculpin							125				16,227			596,022		
Sea Bass—Black														24,060		
Sea Bass—White										728		10	7,545	20,063		
Sea Bass—White										5,997		1,309	12,029	20,063	2,261	22,382
Sea Trout			2,797				5,169	16		26,215	5,403	1,934	27,247	68,781	82,370	24,372
Shad														135		4,576
Shad—Buck					560									6,969		
Shad—Roe					24									24		
Sheepshead																
Skates		650					47,126	925		47	10,732	10	12,115	22,904	70	313
											3,527			52,228		

